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ABSTRACT

This two-volume document describes a study which focused on characterizing the elements involved in information seeking and retrieving, particularly in relation to the cognitive decisions and human interactions involved in online information retrieval. The study objectives were to conduct experiments and observations, under conditions as close to real life as possible, related to: (1) the user context of questions in information retrieval; (2) the structure and classification of questions; (3) the cognitive traits and decision making of searchers; and (4) the comparative nature of the search of the same question by different searchers. Study results indicate that fluency in associations in English and in English idioms seems to be an important characteristic of more effective searches; that items retrieved in searches in which the searcher displayed results more frequently are more likely to be relevant, and that higher recall is achieved when outputs from several searchers are merged. Volume 1 describes the study background and presents the study methodology; basic background data; a summary of the results; and statistical analyses of study data organized according to the five variables of information seeker or user, question, searcher, search, and retrieved items. An executive summary, 2 figures, and 60 tables are included, as well as a 48-item bibliography. Volume 2 comprises nine appendices, including questionnaire statements provided by the users, raw retrieval results for each searcher and question, forms used in the study process, and study procedures and flowcharts. (KM)

EXPERIMENTS ON THE COGNITIVE ASPECTS OF INFORMATION SEEKING AND INFORMATION RETRIEVING

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Final Report

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EXECUTIVE SUMMARY

Final Report on NSF Grant IST 85-05411

EXPERIMENTS ON THE COGNITIVE ASPECTS OF INFORMATION SEEKING AND INFORMATION RETRIEVING

Tefko Saracevic, Paul Kantor, Alice Y. Chamis, Donna Trivison

The aim of the study was to contribute to the formal, scientific characterization of the elements involved in information seeking and retrieving, particularly in relation to the cognitive decisions and human interactions involved. The objectives were to conduct experiments and observations under as real-life conditions as possible related to: (1) user *context* of questions in information retrieval; (2) the structure and classification of *questions*; (3) cognitive traits and decision-making of *searchers*; and (4) different *searches* of the same question. Models and measures were developed to reflect the problem-solving approaches of users and searchers. In that, the study relates to problem oriented research in information science, cognitive science, and artificial intelligence.

The following aspects of information seeking and information searching were studied as grouped in five general classes of the entities involved:

1. *User*: effects of the context of questions and constraints placed on questions
2. *Question*: structure and classification assignments by different judges and the effect of various classes
3. *Searcher*: effects of cognitive traits and frequency of online experience
4. *Search*: effects of different types of searches; overlap between searches of the same question in selection of search terms and items retrieved; efficiency and effectiveness of searches
5. *Items retrieved*: magnitude of retrieval of relevant and nonrelevant items; effects of other variables on the chances retrieved items were relevant

Forty users each posed one written question related to their ongoing research or work. In addition, during an interview each user supplied a tape recorded statement on the underlying problem of his/her research. They also marked measures on the context of the question dealing with problem definition, intent, internal knowledge, and public knowledge estimate. Forty searchers were assembled: 36 so called 'outside' searchers who searched five or six questions based on the user's written question, three project or staff searchers who conducted four different types of searches ('project searches') and classified questions and one additional judge for question classification. The project searches were based on: 1. the user's tape recorded problem statement only 2. taped problem statement plus the written question 3. terms from the written question only without elaboration, and 4. terms from the written question plus elaboration by thesaurus. Each searcher was tested on three cognitive tests: (1) Remote Associates Test (RAT) designed to test ability in making word associations; (2) One test from a group of test called collectively the Employee Aptitude Survey (EAS), the Symbolic Reasoning Test designed to test the ability to make deductive inferences from symbolic inequalities; (3) Learning Style Inventory (LSI) designed to characterize an individual according to preferred style of learning. Searchers also indicated a frequency of DIALOG use. Searching was done on DIALOG: a single DIALOG database was searched for each question.

Each of the 40 questions was searched by five outside searchers and four project searches. The output from these nine searches was merged into a union, i.e., duplicates were eliminated. The union was then sent to the user for evaluation. If the union exceeded 150 retrieved items, only the first (most recent) 150 items were sent to the user. This was done in order to avoid user overload and to ensure return. Users indicated whether each item was relevant, paritally relevant, or nonrelevant. Additionally, users scored five utility measures: time spent in evaluation, dollar value, worth of their time, contribution to problem resolution, and overall satisfaction. These evaluations were used as benchmarks for figuring precision and recall of the searches and for study of the other variables. All together 90 variables were defined.

For each question there were nine searches (five outside searches and four project searches), resulting in a grand total of 360 searches (200 outside searches and 160 project searches) for the 40 questions. The sum of items retrieved (counting search by search for 360 searches) before duplicates were eliminated included 8956 evaluated items, and after duplicates were elimінted, the total number of unique items was 5411. Of the 5411 unique items, 1343 or 25% were judged relevant by the users, 1448 or 27% were judged partially relevant, and 2620 or 41% were judged nonrelevant.

Statistical analyses in search of variables which could provide explanations of the observed search processes were done on two levels: search-wise and item-wise. On the search-wise level, impact on precision and recall was considered. On the item-wise level, impact of variables on the chances that retrieved items were relevant as opposed to nonrelevant was considered. For all except one analysis, relevant (R) and partially relevant (pR) items were considered together (i.e., R + pR). A summary of results follows. Wherever means are given, they should be interpreted with caution because no distribution was normal (bell shaped): all of the distributions were either skewed in one direction or had several peaks.

1. Users' indication of question context. The context elements: (1) problem definition (how clearly defined), (2) intent

(how specific the intended use), and (3) estimate of public knowledge (probability that public information exists) had a significant impact on the chance of retrieval of relevant items. When a problem was considered well defined, a retrieved item was 17% more likely to be relevant; when intent was 'open to many avenues' there is a 27% decline in the chance a retrieved item was relevant; and when there was a high estimate of the existence of public knowledge, the chances for relevance increased 110%. High or low internal knowledge (estimate by the user of the extent of personal knowledge), the fourth user context measure, had no significant impact on relevance.

2. Users' constraints on questions. Specifications about language and years of publication had a significant impact on the chances that a retrieved item was relevant, while type of application and request for a precise or broad search did not. None of the variables had a significant impact on the precision of the union of retrieved items submitted to the user. (Comparative recall for given searches can be calculated, but recall for the question as a whole, i.e., for the union output, cannot be calculated because we do not know what relevant items were left in the DIALOG file). If the language was not restricted to English, chances for relevance were reduced by 37% and enhanced by 28% if there were no restrictions on year of publication. The mean precisions for various constraints were: by application: 50% for faculty research, 49% graduate study, 49% industry and 66% other; by language: English only 56%, any language 42%; by years: last five years 58%, no limit 48%.

3. Consistency and estimate of user context by searchers. Searcher judgements of question context was compared with user judgements. There was substantial agreement on how well the problem was defined, followed by agreement on the specificity of the intended use. Agreement on estimates of the existence of public knowledge about the problem was low--users judged it considerably higher. User estimates of their internal knowledge about the problem was as expected higher than searcher estiamtes. Thus, to some degree, searchers are able to estimate user assessments of context. However, only intent and public knowledge had an effect on chances for relevance. When searchers assessed user intent as narrowly defined, an item retrieved was 32% more likely to be relevant. When searchers assessed substantial public knowledge, chances for relevance improved a small 11%.

4. Consistency of judgement on question classification between two judges. When given the same question to classify using a scheme developed for the study there was substantial agreement on a number of categories: (1) general subject domain of the question (number of DIALINDEX categories); (2) clarity of semantics and syntax; (3) specificity of the subject of the questions, and (4) constraints. There was poor agreement on: (1) specificity of the query about the subject of the question, and (2) complexity, or, the number of concepts involved in the question. Overall, question classification as specified seems to be valid, however, more consistency tests are needed.

5. Impact of question classification categories. There was some significant impact on retrieval of relevant items by questions that were judged high on clarity and high on the number of constraints and concepts. In other words, clearly structured questions, with a greater number of concepts and constraints significantly favor the chances of finding relevant items. Other categorizations showed little or no impact.

6. Searcher characteristics. Some cognitive traits showed positive impact and some negative impact on relevance of retrieved items. An item retrieved by a searcher with higher scores on the Remote Associates Test (English word associations, some of which were idiomatic) was 65% more likely to be relevant. Items were 11% less likely to be relevant if retrieved by a searcher scoring high on the Employee Aptitude Survey (deductive inference from symbolically expressed inequalities). Searchers categorized as having a mode of learning called Abstract Conceptualization (tends to learn by abstract thinking) had 25% improved chances for relevance, while searchers categorized as preferring a Concrete Experience style (tends to learn by doing) had 28% decreased chances for relevance. On combination scores of the learning style test, searchers who emphasize abstractness over concreteness had 28% improved chances for relevance. Therefore, searchers with higher language abilities (regardless of specific subject) and/or preferring an abstract style of learning have increased chances for relevance while searchers with higher mathematical-logical abilities and/or a concrete experience style of learning have decreased chances for relevance. Searchers who participated did searching as part of their professional functions, some more and some less frequently, however, frequency of DIALOG searching did not show a significant impact on chances for relevance.

7. Search efficiency characteristics. The most significant positive impact was observed in searches using more cycles. (A cycle is defined as a sequence of commands from selecting terms to displaying results, thus cycling involves the possibility of review and feedback.) Items retrieved by searches using a greater number of cycles were 25% more likely to be relevant than items from searches using fewer cycles. Significant negative impact was produced by: greater amounts of preparation time (items were 13% less likely to be relevant), greater total time (36% less likely) and more search terms (39% less likely). Thus, searchers that use more cycles, not overly much preparation and total time (including online) and not a great number of search terms have a better chance of producing relevant items. On the average per search there were: 15 commands, 3 cycles, and 10 search terms used after 10 minutes of preparation time, 12 minutes online time, and 22 minutes total time. Ranges varied widely however. None of these search characteristics explained more than 5% of precison or recall for the search overall (the search-wise level of analysis). This is an example of the inability of a search-wise level of analysis to detect differences.

8. Types of searches. There was significant impact on recall and no impact on precision observed in the four different types of

searches (i.e., the project searches). Searches based on: (i) taped problem statement by user had 32% mean recall and 63% mean precision; (ii) written question statement plus elaboration by thesaurus had 25% mean recall and 61% mean precision; (iii) taped problem statement plus written question had 23% mean recall and 63% mean precision; and (iv) terms from the written question with no elaboration had 18% mean recall and 57% mean precision. The best performance was on searches done on the basis of a user explanation and discussion of his or her problem (taped problem statement) and worst when words from the written questions were used as terms without elaboration, as if they had been picked automatically.

9. Overlap of search terms and items retrieved. [Note: As recalled, each question was searched nine times: five 'outside searches' each done by a different searcher and four 'project searches' based on different sources for the search (see preceeding point) done by staff searchers. Overlap was studied only for the five 'outside' searches, i.e., comparisons were made of the degree of agreement in selection of search terms and in items retrieved for each pair of five searches done for a question. The number of pairs compared was 800 = 5 searches per question X 4 comparisons for each search of that question (the search was not compared with itself) X 40 questions.]

There was a surprisingly low degree of agreement on selection of search terms between different searchers searching the same question. The mean agreement on search terms was 27%, but the distribution was skewed toward the low end. In 20% of the comparisons, agreement was 10% or less and in 44% of the comparisons agreement was 20% or less.

The overlap in retrieved items for the same question by different searches was even lower than the overlap observed in selection of search terms: the mean was 16%; in 59% of the comparisons overlap was less than 5% and in 66% of the comparisons overlap was less than 10%. In retrieval of relevant items, in 59% of the comparisons overlap was less than 5% and in 64% of the comparisons overlap was less than 10%. Surprisingly, the substantial disagreement in items retrieved could not be explained by disagreement in search terms used. Only 2.5% of the variation in overlap of retrieved items could be attributed to overlap in search terms. These are some of the most surprising findings of the study.

10. Odds of relevance in retrieval of duplicate items. [Note: a question was searched by five different searchers. In this analysis, we studied duplicate retrievals, i.e., the same item retrieved by two, three, four, or five searches. In all previous and subsequest analysis relevant (R) and partially relevant (pR) items were considered together (i.e., R + pR). For this analysis, only the number of relevant items is being considered, excluding partially relevant items. This was done to sharpen insight into the odds for relevance.]

The more often an item was retrieved by different searches for the same question, the more likely it was to be relevant. For all retrievals (those retrieved once and those retieved more than once) the odds an item was relevant as opposed to nonrelevant were about five to ten. If an item was retrieved only once (out of a possible five searches) the corresponding odds were four to ten; items retrieved twice had an even chance of being relevant or nonrelevant; for items retrieved three times or more (i.e., three, four, or five times) the odds were quite favorable for relevance, 16 to 10. In other words, when an item is retrieved three or more times, the odds for relevance are much greater than the odds for nonrelevance. This we consider the most significant finding of the study.

11. Recall and precision. The mean recall and precision values for searches confirm similar figures from other studies. For 360 searches, the mean recall was 22% and mean precision was 57%. However, the next finding is contrary to many studies and contrary to the Cleverden Law: when recall was plotted against precision the two were not inversely related. To the contrary, when either recall or precision was considered as the independent variable, the other rose mildly. As precision rose so did recall (although not as much) or vice versa, as recall rose so did precision, also rather mildly. The plot of recall and precision shows a large amount of scatter. The most important explanatory variable for precision was the user estimate of existing public knowledge--it explained 10% of the variance observed. The next variable, which explained 5% of the variance, was a searcher characteristic measured by the Remote Associates Test of word association ability. No other variable used passed the test for significance. For recall, only one variable was mildly significant: a combined score on the Learning Style Inventory which indicated an individual's emphasis of abstractness over concreteness as a learning style. This variable explained somewhat less than 5% of the observed variation. A low percentage of variation in recall and precision could be explained by variables used in this study. For the most part, we still do not know what variables have a large contributory effect on recall and precision.

12. Utility assessment by users. Four out of the five utility measures used in the study correlated positively with chances that a retrieved items was relevant while the fifth measure had no effect. Items in searches where the user considered the value of the search results above $75 were 28% more likely to be relevant than items retrieved in searches valued below that amount. Where users indicated that the results were worth the same or more than the time they spent, the chances for relevance were 104% greater. Where users indicated a greater contribution made toward resolution of their problem, chances for relevance were 84% greater. Where users indicated a higher degree of satisfaction, chances for relevance were 73% greater. In other words, relevance of items submitted and user utility scores seem to be parallel, indicating the possibility that relevance and utility as measures are not very different from each other.

13. Two levels of statistical analysis. Of the two levels of analysis used, the item-wise analysis (based on relevance of items retrieved) showed more power for explanation and insight than the

search-wise analysis (based on precision and recall). While the item-wise approach is common in biomedicine, this is the first time, to our knowledge, that it was applied in information science. Results recommend its use.

This study addressed the question of what is happening in information seeking and retrieving. The results beg further studies for verification, explanation, and generalization based on confirmed experimental evidence.

Implications of this study are many. They extend to future research, education and training of searchers, professional practice, guidance of users, and most importantly, to design and improvement of human-system interfaces. To be successful, design of future intelligent human-system interfaces and intelligent information systems will need to take into account results from studies such as this one because the human-system interface must first be based on the human part of the equation and then on systems and technology.

PREFACE

The aim of this report is to present in some detail the data and results of a study investigating a variety of aspects related to questions, searchers, and searching, in the context of information retrieval systems. The study is a part of a larger effort whose collective aim is to contribute to a formal or scientific characterization of the elements involved in information seeking and retrieving, particularly in relation to cognitive decisions and human-system interactions.

This larger effort is divided into three parts or phases. The first phase (NSF grant IST 80-15335, conducted from 1981-83) was a methodological investigation devoted to development of models, methods, and measures suitable for collection of data and observation of a series of variables involved in information seeking and searching. The second phase involved the study presented in this report (NSF grant IST 85-05411 and a 1985-86 DIALOG grant for search time, conducted 1985-86). This phase was devoted to testing of the aforementioned models, methods, and measures and a series of quantifiable observations made under as real-life conditions as possible. The third phase (planned for study in 1987-88) will be devoted to an exhaustive analysis of collected data and search protocols in order to describe the nature and objective patterns (if any) in searching and in the relation between questions and answers as evaluated by users in order to make recommendations for the design of advanced human-information system interactions and for increased system intelligence.

As such, this study and the larger effort responds to an urgent need for more research and more scientific evidence related to information seeking and searching. Online searching is an ever growing activity. New information systems, such as expert systems, new technologies and interfaces will increase the realm of users, searchers and uses. Unfortunately all this growth in professional practice and the widening of technological applications has not been accompanied by a commensurate effort in research. In this area, science is lagging far behind practice and technology. While there are a number of related research studies (enumerated in the bibliography) concentrated in information science and artificial intelligence, the whole area of scientific study of human information seeking and searching of questions and question-answering and the human-system interface is barely beyond infancy. We are all asking the same question: What evidence do we have and can we collect that will give us some scientifically supported insight into what is really going on in these processes?

The present study has produced a wealth of data that in itself is a considerable and even unique research resource. Our idea is to exploit further this data and provide open access to this data to all who desire to use it further (and, of course, have resources to do so). To this end we have prepared this final report in two parts. The first part contains descriptions of methods, results, and conclusions. The second part is composed of a set of appendices containing as much of the 'raw' data as we could reasonably reproduce. The rest of the data in machine-readable form is deposited with the complete project archive reproduced at two universities: Case Western Reserve University (contact Paul Kantor) and Rutgers, The State University of New Jersey (contact Tefko Saracevic). The first part, containing results, can be read without the appendices. In other words, the first part stands on its own and the appendices are an invitation for verification, replication and further in-depth studies.

To our knowledge, this is the largest project of its kind anywhere, using the largest number of real users (40) and real questions (40), real professional searchers (40), real operating databases and a real operating information system (DIALOG). The number of items retrieved and evaluted by the users for relevance to their question (5411) is also among the largest (if not the largest) of any similar study, including tests of retrieval systems.

Still, we cannot claim generalizations beyond our sample, any more than any other similar study has been able to claim. We have not done a random selection of searchers, users and questions in the United States or whatever universe. However, we can offer our observations with the hope that other studies, particularly replications, may confirm, refute and/or enlarge upon our observations.

Organization of the Report

As mentioned, the report is organized in two volumes. This volume contains the text, while the second volume contains the Appendices including: written question statements provided by the users, 'raw' retrieval results for each searcher and question, forms used, and the procedures and flowcharts of the study.

The discussion is organized around the five entities or classes of variables of interest in this study:

1. Information seeker or user

2. Question

3. Searcher

4. Search

5. Retrieved items

Part I provides the background for the study: an introduction with a definition of the above entities; a summary of the study's aim, objectives, and approach; and a review of the literature. Each successive part is organized along the five entities of the study.

Part II is devoted to methodology. The description of the models, measures and procedures used is given in the order of the entities as listed above.

Part III contains the basic data giving background data on users and searchers, and a summary of results pertaining to efficiency and structure of searches, number of items retrieved and their evaluation and the resulting effectiveness of searches.

Part IV is devoted to statistical analysis. It contains a chapter describing the methods used for analysis and three chapters on results: one on consistency of judges in assigning question classification, and assessing context of questions, another on overlap in search terms and results among searchers, and the longest one rehearsing the correlation of variables among the various entities in terms of how they affect retrieval of items judged relevant by users.

Part V contains conclusions and a discussion of results with implications for practice and research.

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Principal Investigator

NOTE: Additional experiments and analyses were performed after the completion of this Final Report, thus they are not reported here. The whole study, including the additional data and analyses is reported in a series of three articles in the Journal of the American Society for Information Science.

PART I. BACKGROUND

1. INTRODUCTION: PROBLEM AND SIGNIFICANCE

While there is great variety in the design and operation of retrieval systems and a great many variables interact to affect system performance, the set of variables that deal with: (i) the nature of questions, (ii) the context of information seeking, and (iii) the conduct of searching, can and do affect performance to the extent that they spell the difference between failure and success regardless of the design of the system.

The problems associated with processes and variables of information seeking and searching are the most complex of all the problems involved with retrieval systems, because of an overriding influence of the cognitive aspects. The cognitive dimension predominates in interactions between humans and information systems. Yet and even more importantly, it is the least researched of all the dimensions of information retrieval systems of all types. The context of requests involves a host of variables in informaion seeking and the handling of requests involves a host of variables in information retrieving. Fidel and Soergel [1-1] provided a list of over 200 such variables grouped in eight broad classes.

Of interest to this study are five general classes of variables or entities that deal with the:

1. Information seeker or user - a person who: (i) is confronted with a problem on the basis of which a question is formulated, (ii) provides a context for the question; and (iii) produces the ultimate evaluation of the retrieval results.

2. Question - a specific text of a request by the user for information submitted to an information system.

3. Searcher - a person performing the necessary question analysis, formulating the search strategy and conducting the search. User and searcher could be the same, however, in this study we have been concerned with intermediary searchers, i.e., information professionals who perform searching on behalf of others.

4. Search - the process of question analysis, construction of search strategy, and conduct of searching in order to retrieve items as potential answers to a question.

5. Retrieved Items - the records retrieved from a database(s) in whatever form the database allows for (e.g., abstracts) and the user or searcher specifies; all or some of the retrieved items are provided to a user as potential answers.

Investigation into the nature and behavior of variables in these five classes--the information seeking and information retrieving variables--is a significant area of study for at least four reasons:

1. Contribution to knowledge - Investigations into the construction and experimental verification of models involving information seeking and information retrieving are an important contribution to the empirical foundations of information science in general and information retrieval in particular.

2. Design of information systems - By necessity the design of all retrieval systems and particularly of those that attempt to incorporate a certain amount of intelligence and/or natural language has to be based on certain assumptions about human information seeking and relations between questions and answers. More often than not the source for these assumptions is intuition or guessing, rather than scientific evidence. More solid scientific evidence on the cognitive aspects of information seeking and searching is urgently needed for improvement of existing systems and designing future systems, particularly in the area of human-systems interaction.

3. Guidance to information seekers (in the conduct of effective and efficient searching) - This includes training of information professionals as searchers and many aspects of transparency for system-user interface. The present state of such guidance leaves much to be desired. Scientific evidence on the nature of the searching process can definitely help improve this critical area.

4. Relation to cognitive science and artificial intelligence - Problems addressed here are closely related to studies of question answering[1-2]. However, as Graesser remarked, the various different fields investigating questions are rather isolated from each other and a multidisciplinary study of questioning is necessary. This was an attempt to study questioning in an interdisciplinary manner as called for. This is especially significant for expert systems.

2. AIM, OBJECTIVES, APPROACH

The aim of the study, as mentioned in the preface, was to contribute to the formal, scientific characterization of the elements involved in information seeking and retrieving, particularly in relation to the cognitive decisions and human interactions involved.

The objectives were to conduct a series of experiments related to the:

1. Context of questions in information retrieval as provided by the user posing the question

2. Structure and classification of questions

3. Cognitive traits and decision-making of searchers

4. Comparative nature of the search by different searchers of the same question.

The study concentrated on applying and testing the models, methods, and measures developed in the preceeding study (mentioned in the Preface). These together with some of the underlying concepts were elaborated in a number of articles and reports [2-1 to 2-12] and are summarized in Part II.

The approach taken was to use as real-life situation as possible, rather than to build laboratory systems and situations and test them. This approach has obvious strengths and weaknesses. The major strength was elimination of artificialities and smallness of scale built in by necessity in the laboratory approach. The weakness was the difficulty in imposing controls and the impossibility for allowing for some parts of the real-life situation, especially where several searchers are searching the same questions. The users were real in the sense that they posed questions related to their research or work at hand. The users were not paid for their time, but the search was provided free. The searchers were real in the sense that searching is a part of their professional function. The searchers were paid for their searches. The searching was real in a sense that the existing databases on DIALOG were used. The control was that all the searching was done under the same conditions, using the same search tools, equipment, and protocols. No other restrictions were placed on the searchers or search time.

However, for control purposes there were two major restrictions. First, searching for one question by different searchers involved only one and the same database. Searchers did not choose the database, project staff chose the database according to the close connection between the subject of the question with a given database. In real life more than one database may be searched, but we could not control independent selection. Second, searchers did not have access to users for an interview about the question. Users provided an elaborate statement of the question, together with an indication of the type of search and restrictions wanted (see Appendix A) and each searcher was given that statement. There was no way that we could control the interview of five different searchers with the same user. Besides, the power of interviewing was not under investigation. Thus we used the approach of doing the searching without an interview, an approach that is not uncommon in real-life as well.

While we label our studies as experiments, they are not experiments in the narrow and scientific sense of testing a randomly selected sample under controlled conditions with a well defined hypothesis. These are experiments in a broader scientific sense involving observation of the behavior of a population under conditions which were as controlled as possible. Because this was not a random selection of users, questions, searchers, and information sources the power of statistical conclusions is different. The conclusions pertain to the sample. Generalizations should be treated with caution and as hypotheses for further testing. However, the sample used may not be atypical as found in the general population of information users and searchers.

3. RELATED STUDIES

3.1 Reviews

Several excellent reviews have appeared recently on topics related to this study, thus our own review can be brief. The most extensive is the review by Belkin and Vickery [3-1] on interaction in information retrieval systems. While they have found a large literature dealing with interactions in a variety of systems from document retrieval to knowledge-based systems, they also found that the number of scientific studies included was relatively low and results not well cumulated. Many models have been suggested, however, the methodological problems in testing these models are serious. A major conclusion is that "...research has not yet provided a satisfactory solution to the problem of interfacing between the end-user and large scale databases."

Because there are many factors involved in human interaction with retrieval systems, a considerable amount of research has been devoted to the study of user characteristics in general and psychological factors relevant to human behavior during user-system interaction in particular. Dervin and Niles [3-2] reviewed the former studies and Borgman [3-3] the latter. Dervin and Niles point out the changing paradigm in user studies and advocate more objective studies. Borgman, in concentrating on the review of psychological problems, concluded: "...some of the research results have advanced our theoretical understanding of the interaction between human and computers, and in the process have added to the general body of behavioral knowledge." She suggested that further research is needed to study why information systems are hard to use and how they can be improved. She adds that an expansion of the study of cognitive models is needed as well as studies on how to apply results to system design and to user training.

In earlier reviews, Bates [3-4] noted a clear absence of research comparing strategies which could influence searcher performance and Fenichel [3-5] suggested that research should be directed towards understanding the nature of user-system interaction, and "...what is actually happening at the man-machine interface of online systems."

It is most indicative that the conclusion of all of the reviews of the literature on the human-system interface in general and online searching in particular are similar, despite different orientations of the reviews and different backgrounds of the reviewers. The literature is large, there are numerous models, inventories of variables, and description and prescription of processes suggested. However, there is still a remarkable paucity of empirical evidence, controlled observations and experimental studies. As a result, as yet we do not have clear ideas supported by evidence about such aspects as:

...What cognitive traits have significant effect on searching for information in particular and on human-system interaction in general?

...How do people differ in searching and in human-system interface, how much and how significantly do they differ, and what accounts for the difference?

...What makes a "good" search and searcher?

The significance of these and similar questions for the design of future and more intelligent information systems and human-system interfaces cannot be overemphasized. The studies addressing these questions with supporting evidence are still in an exploratory stage. This study is one of them.

3.2 Models

A number of models have been suggested involving the context of information seeking, questions, and the search process. The term "model" is used here broadly to include classic models as well as an inventory of variables and descriptions or prescriptions of processes. Some representative models are reviewed here.

Already mentioned is the exhaustive list of variables by Fidel and Soergel [1-7]. This long list of over 200 variables grouped into eight broad categories illustrates the complexity of online searching.

The context of information seeking received considerable attention in modeling. For a long time the predominant concept around which models revolved was the concept of information need; we shall mention Taylor's work [3-6] as representative of this school of thought. Slowly modeling changed to that of problem orientation, viewing the problem behind the question rather than information need as central to the information seeking context. The work by Belkin [3-7] is representative of the problem oriented school of thought, which has increasingly borrowed notions and approaches from cognitive science. The study reported here belongs in this category.

The nature of questions, as reviewed by Graesser and Black [1-2], has been a subject of study in a number of fields from philosophy and logic to computer science and artificial intelligence. Librarianship has many works on classification of questions, some going back over 50 years [3-8]. More recently, the whole area of questions and questioning became an intensive area of study in artificial intelligence because of its importance to natural language processing, question-answering systems, and expert systems. The book by Graesser and Black is representative of work in this area. So is the pioneering work by Lehnert [3-9]. Among other things, she provided a novel classification scheme for questions. The work on questions in artificial intelligence is innovative, but it also demonstrates that the progress in this area is slow and incremental. The reported study is complementary to this work in artificial intelligence.

A number of works in information science have been devoted to modeling and description of the search process, these range from simple flowcharts to complex analysis of the elements and steps involved. Here are some representative works:

...elements and tactics in question analysis and search strategy, Bates [3-10, 3-11]

...types of search strategies, Markey and Atherton [3-12]

...definition and principles of user interviews and search processes, Soergel [3-13]

...identification of heuristics and tactics that are applicable to a wide range of search problems, Harter and Peters [3-14]

Most of the descriptions in these studies have been inferred from observations of professional practice or describe desires to improve practice and make it more standardized. Remarkably few models have been put to a scientific test.

3.3 Empirical Studies

The factors affecting online searching and human-system interface have been studied in a number of experiments in which data were collected under (more or less) controlled conditions. Here is a list of representative topics in such studies:

...differences in searching and in search results as affected by various degrees of searching experience, Fenichel [3-15]

...relationship between some given cognitive characteristics or educational level of searchers and type of searching and/or search results, Brindle, Bellardo, Woelfl [3-16, 3-17, 3-18]

...types of elements, sequences, and modifications in the search process, Penniman, Fidel, Oldroyd and Cetroen [3-19, 3-20, 3-21, 3-22]

...effects of the type of training received by searchers, Borgman [3-23]

...effects of various types of search questions and various user goals on searching, Rouse and Rouse [3-24]

Some of the conclusions resulting from these studies were:

...modification of search strategy during searching is very important, but most searchers do not use the interactive capabilities of online systems

...searcher training and experience affect search results, but searchers with little training often do quite well

...searchers differ considerably in searching the same question

...there are no conclusive cognitive or psychological traits of searchers that are associated in a significant way with search results.

The study repored here is closely related by type to the empirical studies reviewed above. It is building on these studies.

PART II. METHODOLOGY

4. MODEL

4.1 Overview

The model used here concentrates on these aspects:

1. The information seekers or users as a source of questions asked of information systems, and the context involved in terms of: (i) underlying problem, (ii) intent, (iii) internal knowledge state, and (iv) public knowledge estimate

2. The question in terms of its structure and classification in several categories

3. The searcher in terms of several cognitive traits as exemplified by results from standard tests and several indications of searching experience

4. The search in terms of various measures related to structure, efficiency and effectiveness and the degree of agreement among searchers

5. The items retrieved in terms of their evaluation as to relevance by the user and the degree of overlap among searchers.

The various measures and indicators applied in the study characterize the state of one or more elements in the model.

4.2 Information Seekers and Context of Information Seeking

Quite obviously there is more to a question in information retrieval than the words in the text of the question. The information seeker or user has a set of internal cognitive and knowledge states or elements and a set of external environmental conditions that affect everything connected with information seeking. Of the possible factors explored by a variety of investigators (see literature review) we have selected four to explore their effect:

1. Problem underlying the question

2. Intent for use of the information

3. Internal Knowledge State of the user

4. Public Knowledge Estimate of the user

The essence of defining and delimiting the information seeking context in the above way is its problem orientation. Problem solving has been a topic of research in cognitive science for a considerable time [4-1]. Problem approach coupled with internal knowledge states has also been used in theoretical and experimental studies related to different information system designs by Belkin and associates [4-2]. Furthermore, the problem approach is explicit in the information processing model, the mainstay of cognitive science [4-3]. Thus, this approach to modeling of information seeking has a wide application within information science, cognitive science and artificial intelligence.

4.2.1 Problem

Problems facing information seekers are at the root of all information retrieval requests. In other words: no problem, no request. In the framework of information retrieval, a problem can be defined as an unknown in a work or situation. Problem signifies that which causes difficulty in finding or working out a solution.

The resolution of problems requires information on the basis of which decisions can be made and actions undertaken. Such information can be obtained in many ways. One way is to obtain or deduce it from the body of existing public knowledge. The obvious implication follows:

> information retrieval is applicable only for the type of problems for which there is already a solution (or a partial solution) in the existing body of public knowledge or for which a solution could be deduced from such knowledge, unless, of course, the exercise is undertaken to prove that public knowledge on a given topic does not exist.

To learn more about problems we can borrow from research in cognitive science [4-4]. In problem solving research a problem is said to exist when (a) at a given state, (b) it is desired to be at another state, and (c) there is no clear way to get from (a) to (b). Thus, a problem involves givens (a given state at the outset), goals (a goal or desired state), and a mechanism presenting obstacles to change from a given to a goal state. Either of the states could be well defined or poorly defined, leading to four possible categories: (i) the best case: well defined given and goal state; (ii) the worst case: poorly defined given and goal state; and the cases in between (iii) well defined given and poorly defined goal state, and (iv) vice versa.

4.2.2 Intent

In submitting a question to a retrieval system an information seeker inevitably has some purpose in mind for the use of the information. The intent (in the framework of information retrieval) can be defined as a planned or prospective use of information, including constraints, if any, on that information. In other words, in making requests information seekers have some preconceived ideas about:

...the use of the information in respect to the problem

...the amount of time and effort they are willing to spend in absorption of or deduction from the information

...the informational value characteristics in information responses they deem highly desirable: completeness, precision, reliability, timeliness, novelty, confirmation, etc.

...the form characteristic of responses deemed most desirable as to the language, source, formulation and the like

...the economic value they attach to responses, and consequently how much are they able or willing to spend on responses (if not provided free of direct charges)

The intent in information retrieval and the goal state in problem solving as discussed above are related elements. However, they are treated separately because the information seeking intent can be a very specific aspect of problem solving, exclusively devoted to the use of supplied information within the broader context of a goal in problem solving. For instance, the intent of an information request may be to provide a bibliography for a thesis, as opposed to the broader goal of solving the issues raised in the thesis.

Information intent could be convergent, where a type of response is specified, or divergent, where the kind of responses are unspecified. The convergent-divergent classification is not a dichotomy, but a continuum. The importance of a recognition of these types of intents is because intents on different ends of the continuum may have significantly different effects on performance.

4.2.3 Internal Knowledge State

People ask questions because they don't know something or they want to confirm something. Either case deals with their state of knowledge. In the framework of information retrieval, internal knowledge state is a personal variable referring to the degree of knowledge an information seeker has about the problem at hand and/or the request arising from the problem. This element could be more accurately (but less popularly) described as the extent of an information seeker's ignorance about the problem or request. Belkin [4-2] called this an Anomalous State of Knowledge and as mentioned developed an information retrieval procedure based on it.

Internal knowledge state involves many aspects related to cognitive structures and processes: how knowledge is stored, organized, associated, retrieved and changed in one's mind. Research in cognitive science is devoted to these questions [4-3 through 4-5]. Unfortunately, in information retrieval up to now little use has been made of the relevant theories or findings from cognitive science. The model here explicitly recognizes this element. The degree of internal knowledge of an information seeker about the problem and/or the request at hand has potential for considerable influence on search performance and conduct. At issue is the difficult question: how to represent a knowledge state to be useful for retrieval?

4.2.4 Public Knowledge Estimate

Public Knowledge is the recorded knowledge on a subject in the public domain; in the context of information retrieval it refers to the literature on a subject (where 'literature' is broadly interpreted to include all types of records in any medium).

People ask questions of information systems within the framework of public knowledge. This involves a number of aspects such as: their perception of what is (or is not) in the public knowledge about the problem at hand; their perception of (or their familiarity with) the organization of public knowledge; their relation to public knowledge about the problem at hand (e.g., an active contributor); their notion about what they can get from public knowledge, and so on.

The internal knowledge state of an information seeker is measured against public knowledge. The approach to information seeking by a user may be influenced considerably not only by the internal knowledge, but also by a perception of, or knowledge of existing public knowledge, and/or the gaps, inaccuracies, and inadequacies in that knowledge.

Furthermore, such a perception about public knowledge may greatly influence the evaluation of the effectiveness of the information system.

4.3 Characteristics of Questions

4.3.1 Structure of Questions

As a rule, requests in information retrieval consist of three basic elements: a lead-in, a subject, and a query. The lead-in is not directly searchable; it consists of phrases such as: "I am interested in information about..." The subject (or subjects) is (are) the central concept(s) of the search. The query is the specific aspect asked about the subject. For instance:

What are the advertising expenditures of the auto industry?

LEAD-IN QUERY SUBJECT

It is hard if not impossible to search a request which does not have both, subject and query elements present. But the structure can be more complex. For instance, in a request:

...there can be several subjects and/or queries

...the subject and/or query may have modifiers for more specific or alternative concepts

...a query may be implied by the lead-in, in which case the lead-in makes for presupposition of so called world knowledge (e.g. "What are quarks?" Subject: quarks; query: What are = definition of).

...there may be additional elements which are not modifiers but are constraints on output (e.g. "... only in English").

The more complex structure of requests can be represented as:

[_____] [__________ _________] [__________ _________], [__________]
Lead-in Modifier(s) Query(ies) Modifier(s) Subject(s) Constraint(s)

4.3.2 Classification of Questions

It is not uncommon to hear searchers describe given questions as: "complex," "specific," "very general," "difficult," "unsearchable," "unclear," and the like. In such cases searchers are (possibly even unwillingly) applying certain general attributes to classify questions. While no generally accepted classification of requests in information retrieval exists, it is of practical interest to specify certain attributes which could be used to classify or describe requests. Five such attributes are suggested here by which requests could be classified.

1. DOMAIN: The general subject area or topic of the request. Categorization: by subject; done on the basis of some existing subject classification.
2. CLARITY: The degree (or lack) of ambiguity and possibility for more than one interpretation. Categorization: clear/unclear; done on the basis of ambiguity in respect to:
    1. semantics - meaning of terms in request
    2. syntax - logical relation between terms
    3. context - the problem, intent, and internal knowledge state underlying the request.

3. SPECIFICITY: The hierarchical level in the meaning of terms and ultimately the whole request.
Categorization: from high to low specificity; done by categorizing terms on a continuum from very specific (object language) to very general (meta language):

META — META

OBJECT — OBJECT

________________ QUERY   ________________ SUBJECT

4. COMPLEXITY: The number of search concepts, their modifiers and/or constraints in a request.
Categorization: from high to low complexity; done in terms of counting of search concepts and possible permutations.

5. PRESUPPOSITION: The implied (not explicit) conceptual aspects derived from sharing of common sense or world-knowledge indicated by linguistic devices. For instance "What is..." implies request for definition; "Where is..." is a request for location; "When was..." is request involving a time element, etc.
Categorization: The most common conceptual presupposition in information retrieval requests involve: (i) existence or verification, (ii) identity or definition, (iii) quality, (iv) relation, (v) number, (vi) location, and (vii) time; done on basis of examination and application of world knowledge.

We have selected to study two aspects:

1. The consistency of judges in determining the structure of questions and in categorizing questions for clarity, specificity, complexity and presupposition

2. The effect of these characteristics on search performance.

4.4 Searchers

What factors have a significant impact on searchers' decisions and thus on retrieval effectiveness and efficiency as well? The answer is not yet clear. Several studies reviewed above have addressed the question, but there have been too few studies to provide fully tested answers. Furthermore, several dozen papers about the topic have been written, extrapolating from experience and common sense. Derived from these studies and papers, here is a summary of elements that have a significant impact on searchers' decisions:

*Organizational environment: nature of the institution; nature of information seekers' group; managmeent policies; technical aspects such as setting, tools, and resources available.

*Financial considerations: pricing policies of database producers and vendors; type of charging or cost recovery policies in the organization; cost consciousness. (Being overly obsessed with costs generally leads to a decrease in retrieval performance and thus, paradoxically to lower cost effectiveness.)

*Information retrieval knowledge and competency: among the most important are:

...degree of knowledge about information retrieval systems and processes in general

...familiarity with specific databases and their tools;

...competency in the mechanics of searching, e.g., commands, use of technology involved;

...type, breadth and depth of education and training

*Subject Knowledge: degree of knowledge about the subject being searched, particularly the subject vocabulary and information soruces. Knowledge of language: semantic associations, syntactic tranformations, writing norms and styles.

*Cognitive factors: a variety of factors which have a positive effect on retrieval performance and level of effort are:

...ability to make linguistic associations;

...ability to reason symbolically;

...ability to think in a logical and analytical manner.

While recognizing all of these factors in this study we have concentrated only on a certain set of cognitive characteristics of the searcher and to some extent on the subject knowledge of the searcher, as they effect effectiveness and efficiency of retrieval.

We have selected to explore the effect on search performance of the following cognitive traits of searchers:

1. the ability to make inductive inferences through word association

2. the ability to make deductive inferences through symbolic reasoning

3. the style or mode in acquiring and using information in problem solving and learning

Clearly, these are not the only cognitive traits that may be of importance in searching. They have been selected as plausible candidates. The whole area of investigation has barely begun, thus any selection of traits is explorative in nature.

4.5 Search

There are a number of ways that the elements or subprocesses in a search have been described and classified. A common way is to distinguish among:

1. Question analysis: procedures that deal with decisions on terminological, semantic and pragmatic (contextual) aspects of a question in preparation for searching, including determination of appropriate information sources.
2. Search strategy: procedures that deal with decisions on syntactical and logical aspects of searching, incorporation of constraints, if any, and determination of appropriate tactics related to a desired level of effectiveness and/or efficiency.
3. Searching: the physical conduct of the search, including the system, using appropriate protocols and obtaining the output.

4.5.1 Question Analysis

Question analysis involves a set of procedures by which:

...possible ambiguities in a request are clarified

...search concepts are identified and expanded upon

...if possible and necessary an interview or negotiation is conducted with an information seeker

...and the search concepts are translated into terminology acceptable to (or dictated by) a given database(s). This also implies a previous selection of database, if necessary.

In this study we have concentrated on two aspects:

1. Selection of terms for searching and the degree of agreement in term selection by different searchers searching the same question based on the written question statement and using any tools as desired.
2. Differences among the search statements based on different sources for search term selection, namely:

   (i) from a tape recorded problem statement by users, but without recourse to the written question statement

(ii) from a taped problem statement and the written question statement

(iii) from the written question statement using only the words in the question as search terms without any further elaboration

(iv) from the written question statement plus terms from an appropriate thesaurus for elaboration

Aspect 1. was done by "outside searchers" and aspect 2. as the four "project searches" (i)-(iv).

4.5.2 Search Strategy

As mentioned, question analysis deals with semantics, pragmatics and source selection while search strategy deals with syntax, logic, constraints, and tactics. The end result of question analysis is a set (or sets) of search terms appropriate for a question and database(s). The end result of search strategy is a search statement (or statements) incorporating appropriate logic and possible constraints, and oriented to some level (or levels) of performance. The process could be dynamic in that during the search any aspect (terms, logic, constraints, tactics, etc.) may change based on some type of feedback.

Search strategy involves for a given search statement the selection of:

1. Logic: connections between terms expressed by Boolean operators (AND, OR, NOT).
2. Scope: the number of classes of search terms. Determines which of the original search concepts are to be used in a given search statement.
3. Exhaustivity: the number of elaborated search terms within each class. Determines which of the related terms are to be used for a search term.
4. Constraints, if any: the elements of a request not related to terminology and specific to non-subject features of a given database (language, years, source, etc.)

In addition, search strategy involves selection of search tactics.

In the information retrieval framework search tactics refer to the specification of a search statement in correspondence to: (i) a desired level of performance, (ii) the inherent nature of a request and its context, and/or (iii) prescriptions and restrictions imposed by a specific database. Tactics are influenced by an estimate of the effect on performance of given elements incorporated in a search statement. Tactics are also influenced by an estimate of the 'best' way to approach the search for a request.

Three types of search tactics are prevalent in contemporary practice:

1. Tactics oriented toward achievement of certain levels of recall or precision.

2. Tactics oriented toward cycles in searching which are most appropriate for a given type of request, that is, toward separating and combining discrete elements of a search statement and using different types of commands during the search.

3. Tactics dictated by the nature of a specific database in relation to a given request.

The three types of tactics can be used in conjunction with each other, they are not at all mutually exclusive. In all fairness, a fourth type of contemporary tactic should be mentioned: the random tactic. These are tactics used without any conscious effort or rationale for an expected search performance.

In this study we have selected to study the performance of given searches formulated by different searchers as a whole, as indicated by effectiveness and efficiency measures. In particular we have also been interested in effect of cycles.

4.5.3 Searching

As mentioned, searching involves the physical conduct of the search, including the establishment of contact with a given information system, use of the equipment, appropriate protocols, downloading if necessary, etc. While we have recognized that the physical conduct of a search involves a number of variables, we have chosen not to study any of them. We kept searching (environment, equipment, protocols, etc.) constant for all searchers, except for variations in DIALOG system response time which was beyond our control.

4.6 Items Retrieved

Output from a search may be called by a number of names: references, answers, documents, abstracts, displays, etc. We have chosen a neutral label, "items retrieved," to designate the output for a search, that is, the individual records retrieved from a database in response to a question. While databases provide different format options for each item retrieved, we have chosen to use the full database record of each and every item retrieved. Thus, "items retrieved" were full records. In most of the databases searched for the project, full records included bibliographic information, index terms and/or classification, and an abstract. This policy resulted in the most accurate possible user evaluations and built a database of 5411 evaluated items retrieved in machine readable form.

Clearly, the choice from among formats available in various databases could be a variable affecting decisions and evaluations by searchers, but we have chosen not to study these. We have concentrated on the relevance of items retrieved as judged by the users and on the dependence of the probability of relevance on other variables as described above and as further elaborated in the next chapter.

5. MEASURES AND INDICATORS

5.1 Overview

Not only are the variables under observation in this study very difficult to measure, but the measures themselves are a matter of considerable concern. For the most part, measures of performance and indicators of the state of any entity are not standardized nor are the criteria for basing the measures fully agreed upon. With this in mind, we have used measures that have beed widely applied, such as recall and precision. For variables that have no universally associated measures or indicators we have developed our own. In these cases, we have used a Likert-type scale with five points to indicate the degree of agreement, likelihood, or least to most of some property.

System performance or processes are generally evaluated for effectiveness (how well did a system perform in respect to what it was designed to do) and efficiency (at what costs and in what amount of time did it operate). We measured both effectiveness and efficiency, however, we concentrated on effectiveness.

5.2 Indicators of Information Seeking Context

Five Likert-type scales have been used to obtain an indication of the information seeking context first from users and then also as perceived by searchers.

1. PROBLEM DEFINITION SCALE

"In your opinion and on a scale from 1 to 5 would you describe you problem as weakly defined or clearly defined, with 1 being weakly defined and 5 being clearly defined."

:________:________:________:________:________:

1 2 3 4 5

weakly defined clearly defined

2. INTENT SCALE

"On scale from 1 to 5, would you say that your use of this information will be open to many avenues, or, for a specifically defined purpose, with 1 representing open to many avenues and 5 representing a specifically defined purpose."

:________:________:________:________:________:
1 2 3 4 5
open to many purpose is narrowly
avenues defined

3. INTERNAL KNOWLEDGE SCALE

"On a scale from 1 to 5, how would you rank the amount of knowledge you possess in relation to the problem which motivated this request."

:________:________:________:________:________:
1 2 3 4 5
little personal considerable personal
knowledge knowledge

4. PROBLEM-PUBLIC KNOWLEDGE SCALE

"On a scale from 1 to 5, how would you rank the probability that information about the problem which motivated this research question may be found in the literature."

:________:________:________:________:________:
1 2 3 4 5
highly improbable highly probable
that it exists that it exists

The forms on which these indicators were recorded are Forms 7, 8, 9 and 10 as reproduced in Appendix H.

In addition the user was asked on the question request form (Form 5):

1. Do you want a precise or broad search?

   3 - precise

   4 - broad

2. Type of application of this research:

   5 - Undergraduate study
   6 - Graduate study
   7 - Faculty research
   8 - Industrial
   9 - General
   10 - Other (please specify)

3. Do you want to place restrictions on the language of publication of the articles retrieved?

   11 - English only

12 - Any language

4. Do you want to restrict the years of publication of the articles retrieved?

13 - Last 5 years

14 - No limits

15 - Other, specify 19__ to 19__

5. If you are familiar with the DIALOG databases, please indicate those that would be appropriate for your question 16 _________ 17 _________ 18 _________

5.3 Indicators of Question Structure and Classification

In the analysis for structure of the questions the following function components were used:

__________ ________________________________
(Lead-in) (Modifiers) (Query or Queries)

____
(Modifiers) (Subject(s))

____
(Constraints)

An example of this structure applied to a specific request follows:

What are the advertising expenditures of the automobile industry?

________ ________________________ ____________________
(lead-in) (modifier - query) (modifier - subject)

In the classification of categories the following indicators and Likert-type scales have been used:

A. DOMAIN:

Indicate the number of DIALINDEX categories

B. CLARITY:

1. Semantics (meaning of terms)

:________:________:________:________:________:
0 5
unclear clear

2. Syntax (relation between terms)

:________:________:________:________:________:
0   5
unclear   clear

C. SPECIFICITY:

query 1, etc.:

:________:________:________:________:________:
0   5
meta   object

subject 1, etc.:

:________:________:________:________:________:
0   5
meta   object

D. COMPLEXITY:

Number of search concepts ____________________

Number of constraints ________________________

E. PRESUPPOSITIONS:

Total number _________________________________

Number/percent transferable to
  the search process __________________________

These indicators are reproduced in Form 11, Appendix H, as they were used by the searchers.

5.4 Measures of Searchers

5.4.1 Cognitive Tests

To study the three cognitive traits as indicated above (inductive inference, deductive inference, and learning style) three tests were administered to each searcher (further described in Chapter 9):

1. Remote Associates Test: measures the ability to make inductive inferences, specifically, the ability to infer the missing members of word sets. Given sets of three stimulus words, subjects are required to fill in the fourth and missing member of each word set by inferring some property, element, or characteristic that the stimulus words have in

common. The test instrument used was developed by Mednick and Mednick [5-1] and has been applied and tested for 15 years. In essence this is a word association test.

2. Symbolic Reasoning Test: measures the ability to make deductive inferences based on symbols. Each item in the 30 item test specifies a relationship of A to B to C and requires a 'true,' 'false,' or 'don't know' conclusion about the relationship between A and C, e.g.,

   $A > B < C$ therefore $A > C$: T F Don't Know

   The Symbolic Reasoning Test is test 10 of a larger battery of 10 well known tests called the Employee Aptitude Survey developed by Ruck and Ruck [5-2]. It has been applied and tested for 20 years. In essence, this is a test involving inequalities.

3. Learning Style Inventory: designed to measure an individual's preference for each of the four basic modes of learning: Concrete Experience; Reflective Observation; Abstract Conceptualization; and/or Active Experimentation. Each mode represents a characteristic method of acquiring and using information in learning and solving problems. The respondent describes his/her style of learning by ranking sets of four words representing each of the basic abilities, such as in this example:

   I learn by: Feeling - Watching - Thinking - Doing

   The test instruments to be used are those by Kolb [5-3]. The inventory has been applied and used for 10 years. In essence this test places a participant in a grid of learning styles and/or their combinations.

The test instrument cannot be reproduced here because they are copyrighted and sold on request.

5.4.2 Searcher Experience

A searcher questionnaire (Form 3 Appendix H) contained questions reflecting a searcher's experience in online searching:

"1. How often do you search DIALOG? (Please circle the best estimate.)

   5-Daily, 4-Twice a week, 3-Once/week, 2-Twice/month, 1-Less

2. Refer to "List A - Selected Databases" (attached) and please indicate those databases that you search most often, in order of decreasing use. Below each database code indicate how often you search it, using the same codes as in Question

2 above.

Databases used most often

CODE: ___:___:___: etc.

3. Frequency of use of the above databases.

___: etc.

4. Now please refer to "List B - Thesauri" (attached) and indicate those most important to you when you search.

CODE: ___:___:___:___: etc."

5.4.3 Measure of Overlap in Search Terms

This measure indicates for each pair of searchers the degree of agreement or overlap in selection of search terms in searching of the same question. However, because there may be differences in how Searcher 1 agrees with Searcher 2, from how Searcher 2 agrees with Searcher 1 the measure is asymetrical (e.g., Searcher 1 uses two terms, and Searcher 2 uses six terms; the two terms of S1 are also used by S2, but S2 has four more terms, thus S1 is in 100% agreement with S2, but S2 is only in 33% agreement with S1). The overlap or agreement measures for search terms are:

$$S_{1 \rightarrow 2} = \frac{|S_1 \cap S_2|}{|S_1|} = \frac{\text{no. of search terms in common}}{\text{total no. of terms used by Searcher 1}}$$

$$S_{2 \rightarrow 1} = \frac{|S_1 \cap S_2|}{|S_2|} = \frac{\text{no. of search terms in common}}{\text{total no. of terms used by Searcher 2}}$$

These measures can be used to construct a matrix for a whole group of searchers to study the distribution of overlap in search terms for the group as a whole.

5.4.4 Measures for Overlap in Output

This measure indicates for each pair of searchers the degree of overlap in retrieved items for the search of the same question. The overlap measure for output parallels the measure for the overlap or degree of agreement in search terms. It is calculated in the same way except that either the total number of retrieved items or else the number of relevant items retrieved is substituted for the number of search terms. Since the formula is the same as shown in the preceeding section, it is not repeated here. Both overlap measures are asymetrical and both are used by arranging data into a matrix.

5.5 Measures of the Search as a Whole

5.5.1 Criteria for Effectiveness Measures

Two of the most often used criteria for evaluating the effectiveness of a search have been used:

1. Relevance: the degree of fit between the request and the retrieved item. The criteria of "aboutness" is used.
2. Utility or pertinence: the degree of actual usefulness of answers to an information seeker. The criteria used is the value to the information seeker.

In this study both relevance and utility have been established by the users. Relevance, as defined, involves judging the relatedness of the question with that of each retrieved item provided. Utility on the other hand involves judging the degree of satisfaction with the total search (i.e., with all items provided collectively) or the degree of aggregate impact of the search results on resolution of the problem, and the fit with intent and internal knowledge.

5.5.2 Definition of Relevance

Concerning the judgement of relevance the following instructions and definitions have been provided to the users (Form 14, Appendix H):

> "Each abstract should be evaluated according to its degree of relevance to the question you submitted for searching. The degree of relevance should be determined using the following three point scale:
>
> > RELEVANT - Any document which on the basis of the information it conveys is considered to be related to your question, even if the information is outdated or already familiar to you.
> >
> > PARTIALLY RELEVANT - Any document which on the basis of the information it conveys is considered only somewhat or in some part related to your question or to any part of your question.
> >
> > NONRELEVANT - Any document which on the basis of the information it conveys is not at all related to your question."

For the data analysis relevant and partially relevant items were combined into one class and nonrelevant items were left in the other. However, we provide raw data for each question, thus recalculation with any other combination can be done.

5.5.3 Recall and Precision

These are measures based on the relevance judgement of users where:

Precision = probability that a retrieved item is relevant

Recall = probability that a relevant item in the file is retrieved

These probabilities are estimated as follows for a given search:

$$\text{Precision} = \frac{\text{No. of relevant items retrieved by the search}}{\text{Total no. of items retrieved by the search}}$$

$$\text{Recall} = \frac{\text{No. of relevant items retrieved by the search}}{\text{Total no. of relevant items in the union of items retrieved by all searchers for that question}}$$

Precision is easy to establish directly from the output of evaluated items for a search. Recall is not easy to establish, because it is never apparent how many items in a file are relevant to the question. Each question was searched by a number of searchers and types of searches. A union of retrieved items from all searches for the question was established (i.e., by merging all the outputs and eliminating duplicates) and sent to the user for evaluation. In this way the evaluated items from the union served as the benchmark of individual searcher recall. This presents a comparative rather than absolute measure of recall performance for any given search.

5.5.4 Utility Based Measures

These are measures based on users expression of degree of satisfaction and value of the retrieved items as a whole. Recall and precision are universally used measures. Unfortunately, there are no such universally used utility measures, thus we had to etablish our own. The following questions were posed to the users (Form 12, Appendix H), which reflect utility based measures:

"1. How much time did you spend reviewing these abstracts?_______

2. In an overall sense, if you were asked to assign a dollar value to the usefulness of this entire set of abstracts to you, what would that dollar value be?

$ ____________   _______ I cannot assign a dollar value

3. Could you rate your participation in this project and the information which resulted as:

   5 Worth much more than the time it has taken
   4 Worth somewhat more than the time it has taken
   3 Worth about as much as the time it has taken
   2 Worth less than the time it has taken
   1 Practically worthless

4. PROBLEM RESOLUTION SCALE - On a scale of 1 to 5, what contribution has this information made to the resolution of the problem which motivated your question?

   :________:________:________:________:________:
   1   5
   nothing   substantial
   contributed   contribution

5. SATISFACTION SCALE - On a scale of 1 to 5, how satisfied were you with the results of the search?

   :________:________:________:________:________:
   1   5
   dissatisfied   satisfied"

5.5.5 Efficiency Measures

As mentioned, efficiency depends on the cost and time, or the level of effort used to perform a task or function. Costs cannot be directly measured in an experimental setting in a meaningful way. However, time and effort levels can be measured. When level of effort measures are available, cost can be estimated by applying appropriate unit cost figures for time of personnel, computer connect time, number of printed answers, and so forth.

The following efficiency or level of effort measures have been used for online searches:

1. Number of commands used by a searcher

2. Number of command cycles used by a searcher. A cycle is a set of commands in sequence from those used to select, combine, and/or expand terms to a command used to type (or view) the results. A cycle ends with display (type, print) of intermediate or final items retrieved for a set of preceeding commands.

3. Number of search terms used by a searcher searching a question

4. Online connect time used by a searcher in searching a question

5. Preparation time used by a searcher in preparing a search for a question

6. Total time used by a searcher (connect time plus preparation time)

5.6 Measures for Items Retrieved

The following simple measures of quantity were used:

1. Total number of items retrieved for a question by all searches consisting of the union or merged set (duplicates eliminated)

2. Total number of items evaluated by a user for a question. As explained in the section on procedures, when the size of the union of items retrieved for a question exceeded 150, only the first 150 were sent to the user for evaluation, thus the total number of evaluated items is lower than the total number of retrieved items

3. Number of items retrieved and judged relevant for a question, as evaluated by the user

4. Number of items retrieved and judged partially relevant for a question

5. Number of items retrieved and judged nonrelevant for a question

6. Overall precision - the percentage of relevant plus partially relevant items based on the total number of evaluated items for a question

These quantities have been used to calculate the chance of retrieval of a relevant or partially relevant item as a function of some other variable. Thus, these simple measures of quantity when correlated with users, searchers, and search variables considerably expanded the range of observation beyond the rather restrictive recall and precision measures defined for searches alone.

We are able to examine the pooled data (involving the sum of the items retrieved for all searches without elimination of duplicates—this amounted to 8956 retrieved items) and study the influence of any variable on the chance that a retrieved item will be relevant or partially relevant.

6. PROCEDURES

6.1 Users, Questions, Evaluations

On the basis of advertising and mass mailings about the project (see Appendix H), approximately 80 potential users responded and 40 were selected to participate in the project. Each of the 40 users:

...received a form (Form 4, Appendix H) with a short description of the project and a questionnaire about their availability

...was asked to submit one question and to fill out a Question Request Form (Form 5) to record in writing their question statement and to provide information about desired search constraints (e.g., year of publication)

...participated in a tape recorded interview conducted by one of the project searchers in which the user described the problem underlying the question and the use intended. The tapes were not transcribed, but were used as is for project searches (described below).

...indicated the context measures during the interview (Forms 7 and 8)

...after searching, obtained a printout, in duplicate, of up to 150 items retrieved for evaluation. They indicated their relevance judgement for each item, returned the original and kept the copy for their own use

...filled out a questionnaire on Evaluation of Answers (Form 12) which among others contained the utility measures

To insure consistency of the process, the procedures for question handling and for interviews with users were specified in writing (see Procedure No. 1 and 2, Appendix I).

All the users completed all their tasks from start to finish. Thus user response was 100%. The users were not paid for their effort, but they received the search free of charge.

The 40 questions submitted by the users, together with their indication of desired search constraints are reproduced in Appendix A.

6.2 Searchers

A mass mailing about the study was sent to the members of the Northern Ohio Chapters of the American Society for Information Science, Special Libraries Association, and the Online Group.

Presentations about the study were made by the principal investigator and the project manager at the local meeting of these chapters. As a result we received an indication of interest from about 40 outside searchers, 36 of these eventually participated from beginning to end, completing all the tasks. The searchers were paid $100 for their time. Each of the 36 searchers:

...received a description of the study

...was tested on the three cognitive tests described above

...filled out two questionnaires, one on their profile (Form 2) and the other about their search experience (Form 3)

...received instruction on procedures for searching in a presentation and in writing (Procedure No. 3, 4, and 6, Appendix I), including detailed instructions for using the equipment and software for log-in and downloading

...received 5 or 6 questions for searching exactly as each was received from the user in written form, together with the user's instructions for search constraints

...prepared a preliminary search strategy and recorded it on a form (Form 13)

...conducted the search and recorded the results. (The whole search was recorded on a disk and on a printout.)

There were no time limits placed on searchers, nor were any requirements placed on the search strategies they chose to prepare. This required extreme flexibility on the part of the project team, to accomodate to the searchers' schedules.

6.3 Searching

Searching was done on DIALOG, the largest and most frequently used information vendor in the world. DIALOG supplies access for searching to over 150 databases. All searchers had extensive experience on DIALOG.

Each question was searched on one database only, selected by the study team on the basis of closeness of fit between the subject of the question and the subject coverage of the database. The searchers were assigned questions which matched their own subject and database experience, as reported, as closely as was possible. Thus for instance, searchers that search medical databases most often received medical questions. To control for any effect question order had on search results of a searcher, the order in which a question was searched by the five people who searched it was varied.

Searching was done on an IBM-PC and on a Compaq microcomputer.

(Compaq is IBM-PC compatible, using the same operating system, communication software, etc. Thus, for all practical purposes these were identical machines.) Both microcomputers had a Hayes Smartcom modem built in for telecommunication, and the Smartcom software was used for communication and for downloading. Appropriate commands were pre-programmed. With one stroke a series of instructions for log-in through any of the available carriers (DIALNET, TELENET, TYMNET, UNINET) was available; all procedural matters were reduced to macros for all of the searchers.

Searchers were scheduled according to their time availability, however, no more than two searchers could be accomodated at any one time because only the two identical micrcomputers were used.

6.4 Project Searches

As mentioned, each question was searched by five outside searchers. In addition, there were four searches done in-house by the project staff. These additional searches were labeled project searches, and the staff searchers as project searchers. Thus, nine searches were done for each question: five by outside searchers and four by project searchers.

The four project searches were designed to study various types of searches resulting from different sources for the search strategy:

Project Search 1: done on the basis of only the taped interview with the user describing the problem underlying the question and the intended use

Project Search 2: done on the basis of the taped interview plus the written question statement

Project Search 3: done on the basis of only the written question statement using only the terms in the written statement and no elaboration; (this approach is like an automatic language processor preparing the question for searching)

Project Search 4: done on the basis of the written question statement plus elaboration using the appropriate thesaurus

The project searches were done by three project searchers. As mentioned, the three project searchers conducted the taped interview with the users. However, the project searches were arranged so that they were done by the project searcher who did not do the interview. Thus, each project searcher heard the taped interview for the first time when the first project search was done. Procedures for project searches are reproduced under Procedure No. 8 in Appendix I.

As mentioned, there were 36 outside searchers, three project searchers, and an analyst used to test of the consistency of determinations of question strucutre and classification. Altogether there were 40 searchers involved. Each question was searched nine times (five outside searches plus four project searches) and there were 40 questions; thus altogether there were 360 searches performed. Looking at the number of searches another way, 40 questions received (i) five outside searches for a total of 5 X 40 = 200 outside searches; and (ii) four project searches for a total of 4 X 40 = 160 project searches. The 200 outside searches were divided among 36 outside searchers so that each person did five or six questions.

6.5 Question Structure and Classification

This part of the overall study had two objectives:

1. For questions in general, to test the consistency of application of a postulated structure and categorical classification

2. For the 40 questions which were part of the study proper, to provide classification into categories and to use the classifications as one of the variables

The consistency of assigning structure and classification was tested by having two judges assign, independently from each other, the appropriate function designations (lead-in, subject, query, modifiers, constraints) and categories (level of clarity, specification, complexity and presupposition). Two sets of questions were used to test this consistency:

1. The 40 questions used in the study proper

2. An additional 178 questions collected during the preceeding study (1981-83)

The two groups of questions and their classifications were treated separately, because the additional 178 questions had nothing to do with the study proper and were used only as additional supporting (or refuting) data for the test of question classification.

6.6 Handling of Data

A set of procedures was designed and programs were written for handling the variety of data obtained during searching. The flowchart of these procedures is presented in Appendix I. Briefly, the following was involved:

...The end result of each search was a list of accession numbers of items retrieved

...The accession numbers for retrieved items from nine searches for each question were merged and a union set created (duplicates were eliminated)

...If the union of retrieved items exceeded 150, only the first 150 items were designated to be sent to the user for evaluation. This was done to make evaluation manageable for the user who if presented with an overwhelming output might have considered the task unreasonable, and rightly so, and may not have finished. Since all searchers had an equal chance to contribute to the retrieved set, including the first 150 items, there was no bias toward any searchers. DIALOG databases are organized on a last in/first out principle, thus the first 150 items represent the most recent additions to the databases and the literature.

...The full record of each item retrieved in the union set of 150 was downloaded from DIALOG onto floppy disk and then printed. In most cases this represented bibliographic data, indexing and/or classification and an abstract.

...To each item retrieved a line for evaluation was added:
_____Relevant _____Partially Relevant _____Nonrelevant
The printout and a carbon copy were sent to the user for evaluation. The user returned the original with his/her evaluation.

...These evaluations were recorded with the accession number of each item retrieved for a question to serve as the benchmark file against which the output for each search was compared.

...From the protocol of each search, data were obtained about terms, commands, and cycles used for comparison with each other; in addition the preparation and connect times were recorded for each searcher.

...A large master data file was created containing data for each of the variables, i.e., user evaluation for each item retrieved by each search, utility measures for each question, efficiency measures for each search, context indicators, searcher characteristics, question classification indicators, etc.

...This master file was used as a basis for all statistical analysis by creating subfiles for each set of interacting variables (i.e., analysis questions asked) and then analyzing those using standard statistical analysis methods.

While some 20 programs were written to handle the data, at each step manual verification and editing was done to eliminate errors and resolve ambiguities.

7. SUMMARY LIST AND CODE BOOK FOR VARIABLES

The 90 variables are presented in Table 7-1. The list of variables is organized by categories of entities as described in the preceeding sections. The following is given for each variable:

1. A code which was used in statistical analysis

2. Name

3. Short description of the measure or quantity defined

4. Source of the data

This list served as a code book in the study and is a major tool in statistical analysis and interpretation of the data. It is reproduced here in its entirety to provide a quick reference to variable descriptions. In the part of this report on the statistical analysis, there are repeated references to this code book.

TABLE 7-1: DESCRIPTION OF VARIABLES FOR WHICH QUANTITATIVE DATA WERE COLLECTED AND THE CODE BOOK FOR STATISTICAL ANALYSIS

ENTITY	CODE	NAME AND DESCRIPTION OF VARIABLE
RETRIEVED ITEM	1. EVAL	Evaluations of Retrieved Items - A merged set of the full records of items retrieved by nine searches for each of the 40 questions was sent to the 40 users for evaluation. Each item was evaluated as either "relevant", "partially relevant", or "not relevant".
SEARCH	2. SVA	Number of Relevant Items Retrieved by a Search - Number of items retrieved by an individual search of a question and evaluated by the user as relevant
	3. SVB	Number of Partially Relevant Items Retrieved by a Search - Number of items retrieved by an individual search of a question and evaluated by the user as partially relevant
	4. SVC	Number of Not Relevant Items Retrieved by a Search - Number of items retrieved by an individual search of a question and evaluated by the user as not relevant
	5. SVD	Total Number of Items Retrieved by a Search and Evaluated by the User - Total number of items retrieved by an individual search of a question and evaluated by the user
	6. SVE	Items Retrieved by a Search but Not Evaluated by the User - Number of items retrieved by the individual search of a question but not evaluated by the user
	7. SVF	Total Number of Items Retrieved by a Search of a Question
	8. SVG	Search Recall - The percentage of relevant items retrieved by an individual search of a question in comparison to the total number of relevant items retrieved by all searches of the same question
	9. SVH	Search Precision - The percentage of relevant items retrieved by an individual search of a question in comparison to the total number of items the search retrieved which were evaluated
	10. SVI	Number of Commands Used in a Search - Total number of Dialog "select", "expand", "combine" and "type" commands used by a searcher searching a question
	11. SVJ	Number of Command Cycles Used in a Search - Total number of sequences of "select"/"combine"/"type" used by a searcher searching a question
	12. SVK	Number of Search Terms Used in a Search - Search terms "selected" by a searcher searching a question. Search terms entered as a set number

		after an "expand" command were not counted.
	13. SVL	Online Connect Time Used for a Search - The time spent online by a searcher searching a question, counted in fractions of an hour
	14. SVM	Preparation Time Used for a Search - The time spent by a searcher preparing to search a question, counted in fractions of an hour
	15. SVN	Total Time Used for a Search - The time spent by a searcher online added to the time spent offline preparing to search a question, counted in fractions of an hour
QUESTION	16. QVA	Total Number of Relevant Items Retrieved for a Question - Of the total number of items retrieved by all searches of the question (the merged set), those evaluated as relevant
	17. QVB	Total Number of Partially Relevant Items Retrieved for a Question - Of the total number of items retrieved by all searches of the question, those evaluated as partially relevant
	18. QVC	Total Number of Not Relevant Items Retrieved for a Question - Of the total number of items retrieved by all searches of the question, those evaluated as not relevant
	19. QVD	Total Number of Evaluated Items Retrieved for a Question - Of the total number of items retrieved by all searches of the question, those the user evaluated
	20. QVE	Total Number of Not Evaluated Items Retrieved for a Question - Of the total number of items retrieved by all searchers of a question, those items the user did not evaluate
	21. QVF	Total Number of Items Retrieved for a Question - The number of items in the union or merged set of all items retrieved by all searches of the question (eliminating duplicates)
	22. QVH	Overall Precision - Percentage of relevant or partially relevant items for a question
	23. UVA	Time Spent by the User Evaluating the Items - The user was asked on a questionnaire (Form 12), "How much time did you spend reviewing these abstracts?" The questionnaire (Form 12) was sent along with the retrieved items he or she received. Time spent evaluating was counted as hours and fractions of an hour.
	24. UVB	Dollar Value Assigned - The user was also asked on the questionnaire (Form 12), "In an overall sense, if you were asked to assign a dollar value to the usefulness of this entire set of abstracts to you, what would that dollar value be?" (fill in the blank)
	25. UVC	Worth Assigned - The user was asked on the questionnaire (Form 12), "Could you rate your

		participation in this project and the information that has resulted from it as: Worth much more than (5), worth somewhat more than (4), worth about as much as (3), worth less than (2) the time it has taken, or practically worthless (1)?"
	26. UVD	Problem Resolution - The user was asked on the questionnaire (Form 12), "On a scale of 1 to 5, what contribution has this information made to the resolution of the problem that motivated your question? Substantial contribution (5) ... nothing contributed (1)"
	27. UVE	Satisfaction - The user was asked on the questionnaire (Form 12), "On a scale of 1 to 5, how satisfied were you with the results of the search? Satisfied (5) ... dissatisfied (1)"
	28. PREBRD	User Requested a Broad or a Precise Search - At the time the user was given the opportunity to submit his or her written question, he was asked (on Form 5), "Do you want a precise search (3), or, a broad search (4)?
	29. APPLN	Application of Research - Also on Form 5, the user was asked, "Type of application of this research: undergraduate study (5), graduate study (6), faculty research (7), industrial research (8), general (9), or other (10)."
	30. LANG	Limit Retrieval by Language of Publication - On Form 5 the user was asked, "Do you want to restrict the language of publication of the articles retrieved? English only (11), or any language (12)"
	31. YEARGEN	Limit Retreival by Year of Publication - On Form 5 the user was asked, "Do you want to restrict the years of publication of the articles retrieved? last 5 years (13), or no limits (14)"
	32. YEARSP1	Limit Retrieval by Year of Publication from ... - On Form 5 the user had an option to specify a year of the oldest articles desired (fill in the blank)
	33. YEARSP2	Limit Retrieval by Year of Publication to ... - On Form 5 the user had an option to specify a year of the most recent articles desired (fill in the blank)
	34. SUGDB1	Database Suggested by User (first choice) - On Form 5 the user was given an option to suggest a Dialog database (by name, i.e., DIALOG file number) for the search of his or her question (fill in the blank)
	35. SUGDB2	Database Suggested by User (second choice) (fill in the blank)
	36. SUGDB3	Database Suggested by User (third choice) (fill in the blank)
SEARCHER	37. FREQDIAL	Frequency of Searcher's Use of Dialog - Before participating in the searching each searcher was

		asked on a questionnaire (Form 3), "How often do you search Dialog? Daily (5), Twice a week (4), Once a week (3), Twice a month (2), Less (1)"
	38. DBASE1	Dialog Database Used Most Often - On the questionnaire (Form 3) the searcher was asked to select, from a subject categorized list of 85 Dialog databases, the database he or she used most often. Answers were recorded as DIALOG file numbers.
	39. DBASE2	Dialog Database Used Second Most Often
	40. DBASE3	Dialog Database Used Third Most Often
	41. DBASE4	Dialog Database Used Fourth Most Often
	42. DBASE5	Dialog Database Used Fifth Most Often
	43. DBASE6	Dialog Database Used Sixth Most Often
	44. DBASE7	Dialog Database Used Seventh Most Often
	45. FREQ1	Frequency of Use of Dialog Database Used Most Often - On the questionnaire (Form 3) the searcher was asked how often he or she used the Dialog database used most often: Daily (5), Twice a week (4), Once a week (3), Twice a month (2), Less (1)
	46. FREQ2	Frequency of Use of Dialog Database Used Second Most Often
	47. FREQ3	Frequency of Use of Dialog Database Used Third Most Often
	48. FREQ4	Frequency of Use of Dialog Database Used Fourth Most Often
	49. FREQ5	Frequency of Use of Dialog Database Used Fifth Most Often
	50. FREQ6	Frequency of Use of Dialog Database Used Sixth Most Often
	51. FREQ7	Frequency of Use of Dialog Database Used Seventh Most Often
QUESTION AND USER	52. PROBDEF1	Problem Definition by User - During an interview the user was asked (the response was recorded on Form 7), "In your opinion and on a scale from 1 to 5, would you describe your problem as weakly defined or clearly defined, with 1 being weakly defined and 5 being clearly defined?"
	53. INTENT1	Intent by User - During the interview the user was asked (the response was recorded on Form 7), "On a scale from 1 to 5, would you say that your use of this information will be open to many avenues, or, for a specifically defined purpose, with 1 being open to many avenues and 5 being a specifically defined purpose?"
	54. PROBKNO1	Problem-Public Knowledge by User - On a questionnaire (Form 8) presented to the user at the interview, he or she was asked, "On a scale from 1 to 5, how would you rank the probability that information about the problem which motivated this research question may be found in the literature? Highly improbable that it exists (1)

		... Highly probable that it exists (5)"
	55. INTKNO1	Internal Knowledge of User - On the questionnaire (Form 8) the user was asked, "On a scale from 1 to 5, how would you rank the amount of knowledge you possess in relation to the problem which motivated this request: Little personal knowledge (1) ... Considerable personal knowledge (5)"
QUESTION AND PROJECT SEARCHER	56. PROBDEF2	Problem Definition by Searcher - The project searcher was asked after listening to the tape recorded interview with the user (the response was entered on Form 9), "In your opinion and on a scale from 1 to 5, would you describe the user's problem as discernible from the interview as weakly defined or clearly defined?"
	57. INTENT2	Intent by Searcher - The project searcher was asked on Form 9 after listening to the taped interview, "On a scale from 1 to 5, would you say that the use of this information by this user will be open to many avenues or for a specifically defined purpose?"
QUESTION AND ALL SEARCHERS	58. PROBKNO2	Problem-Public Knowledge by Searcher - The project searcher was asked (Form 9) and the searcher was asked (Form 10) at the time he or she prepared to search the question online, "How would you rank the probability that information about the problem which motivated this research question may be found in the literature? Highly improbable that it exists (1) ... Highly probable that it exists (5)"
	59. INTKNO2	Internal Knowledge of Searcher - The project searcher was asked (Form 9) and the searcher was asked (Form 10), "How would you rank the amount of knowledge you possess in relation to the problem which motivated this request? Little personal knowledge (1) ... Considerable personal knowledge (5)"

Question Analysis - The following variables, numbered 60. through 81., relate to the analysis of the 40 research questions done independently by two different judges. Values for each variable for each question were determined by the judges and recorded on a copy of Form 11.

QUESTION CLASSIFICATION (JUDGE 1)	60. CATEGORY	Question Classification (Judge 1): Domain: Dialindex Categories - Using a copy of the categories of databases published by Dialog, the judge determined the subject categories appropriate for searching the question.
	61. CLTYSEM	Question Classification (Judge 1): Clarity: Semantics - Was the meaning of the terms used in the written question clear? Unclear(0)...Clear(5).

62. CLTYSYN	Question Classification (Judge 1): Clarity: Syntax - Was the relation between the terms of the written question clear? Unclear (0) ... Clear (5).
63. CLTYAVG	Question Classification (Judge 1): Clarity Score - determined by adding the clarity: semantic score to the clarity: syntax score and dividing by 2.
64. SPECQURY	Question Classification (Judge 1): Specificity: Query - Were the query terms (query terms were determined using a special definition developed for the question classification process) meta terms or object terms? Meta (0) ... Object (5)
65. SPECSUBJ	Question Classification (Judge 1): Specificity: Subject - Were the subject terms (subject terms were determined using a special definition developed for the question classification process) meta terms or object terms? Meta (0)... Object (5)
66. SPECMEAN	Question Classification (Judge 1): Specificity Score - determined by adding the specificity: query score and the specificity: subject score and dividing by 2.
67. SERCONC	Question Classification (Judge 1): Number of Search Concepts - determined as a total number of concepts involved in the question
68. CONSTRAN	Question Classification (Judge 1): Number of Constraints - for example the years of publications desired
69. TRANSSER	Question Classification (Judge 1): Presuppositions: Number Transferable to Search Process - knowledge presupposed by the question
70. FINAL	Question Classification (Judge 1): Final Summary score - no value was actually attached as a final score

Variables 71. through 81. are a repeat of the question analysis variables just described except they relate to the second judge.

QUESTION CLASSIFICATION (JUDGE 2)	71. CATEG2	Question Classification (Judge 2): Domain: Dialindex Categories
	72. CLTYSEM2	Question Classification (Judge 2): Clarity: Semantics
	73. CLTYSYN2	Question Classification (Judge 2): Clarity: Syntax
	74. CLTYAVG2	Question Classification (Judge 2): Clarity Score
	75. SPECQRY2	Question Classification (Judge 2): Specificity: Query
	76. SPECSUB2	Question Classification (Judge 2): Specificity: Subject
	77. SPECMEN2	Question Classification (Judge 2): Specificity Score
	78. SERCONC2	Question Classification (Judge 2): Number of Search Concepts
	79. CONSTR2	Question Classification (Judge 2): Number of Constraints
	80. TRANSER2	Question Classification (Judge 2): Presuppositions: Number Transferable to Search

Process

81. FINAL2 Question Classification (Judge 2): Final Summary

The following variables 82. through 90. were all derived from the three cognitive tests administered to the searchers.

SEARCHER CHARACTERISTICS

Remote Associates Test

82. RAT Remote Associates Test Score (Searcher) - The test was designed to measure verbal facility and verbal creativity. The test allowed 20 minutes for each individual to answer a possible 30 questions. Each question asked the person to supply a fourth word which related to each of three words which were given. Example: cookies, sixteen, heart, (sweet). The highest score possible was 30.

Employee Aptitude Survey

83. EAS Employee Aptitude Survey Score (Searcher) - This was a test of symbolic reasoning. The person had 5 minutes to complete a possible 30 questions. Example: $A > B < C$, therefore, $A > C$. There were three possible answers: True, False, or ? The highest possible score was 30.

Learning Style Inventory

The test included 12 questions designed to allow a person to describe his individual learning style. The Learning Style Inventory was scored in parts as follow depending upon whether the person's learning style was characterized by Concrete Experience (feeling), Reflective Observation (watching), Abstract Conceptualization (thinking), or Active Experience (doing):

84. CE	Learning Style Inventory (Searcher): Concrete Experience Score - ranging from 12 to 48.
85. RO	Learning Style Inventory (Searcher): Reflective Observation Score - ranging from 12 to 48.
86. AC	Learning Style Inventory (Searcher): Abstract Conceptualization Score - ranging from 12 to 48.
87. AE	Learning Style Inventory (Searcher): Active Experimentation Score - ranging from 12 to 48.
88. ACCE	Learning Style Inventory (Searcher): Abstract Conceptualization/Concrete Experience Score (AC minus CE) - ranging from +36 to -36.
89. AERO	Learning Style Inventory (Searcher): Active Experimentation/Reflective Observation Score (AE minus RO) - ranging from +36 to -36.
90. LSI	Learning Style Inventory (Searcher): Final Score (this score was not used as a variable for the present study).

PART III. BASIC DATA

8. BACKGROUND DATA ON USERS AND QUESTIONS

8.1 Users

The study involved 40 users, each submitting one question for searching. This section contains summary data on the 40 users.

Table 8-1 breaks down the users by occupation. As can be seen, about 48% of the users were faculty, 37% were graduate students, and 15% were from industry. The table also lists the questions (by question number) associated with each group. Full text of each questions is contained in Appendix A and a short title is listed in Table 8-3.

Another way to characterize the users is to list the type of work the user was doing related to the question submitted as presented in Table 8-2. As can be seen, 35% of their work was done as faculty research, 42% as graduate study, 13% as industrial research, and 10% was general or other.

8.2 Questions

Short summaries of the 40 questions are provided in Table 8-3. The table also indicates the question number assigned in the project and the DIALOG file number on which the question was searched. Full text of questions is in Appendix A.

Users had the choice of requesting various restrictions which could be applied to the search of their question. Table 8-4 provides a summary of user requests pertaining to level, language, and years to be searched, and DIALOG databases suggested.

As can be seen, for 90% of the questions, broad searches were requested; 63% requested articles in English language only; 63% placed no limits on year of publication retrieved; and 80% suggested no specific DIALOG file.

8.3 Context

Each user assigned a value for the context measures pertaining to:

1. How well was their problem defined, from 1 (poorly defined) to 5 (well defined)

2. Was their intent well formulated, from 1 (open to many avenues) to 5 (narrowly defined)

3. What was the probability that public knowledge existed on the subject of their request from 1 (low level--highly improbable that it exists) to 5 (high level--it exists)

4. What was their internal knowledge on the problem giving rise to the question, from 1 (little personal knowledge) to 5 (considerable personal knowledge)

Values assigned to each question are given in Appendix A, together with the written statement of the question. Table 8-5 provides data on the cumulative scores for each of the five values over 40 questions. For example, it shows that 10 users indicated five (well defined) on their problem definitions. It also shows:

...58% of the users considered their problem quite well defined (top two scores)

...45% thought that their intended use could be close to "open to many avenues" (lowest two scores)

...60% indicated there was close to certainty that information requested can be found in public knowledge (top two scores)

...45% considered themselves quite knowledgable about the problem at hand (top two scores)

Project searchers were also asked to assign context values for each question they searched. (As mentioned, project searchers did four searches on the basis of: 1. Taped problem statement of users; 2. Taped problem statement plus written question statement; 3. Terms from the written question statement only (no elaboration); 4. Terms from the written question statement plus elaboration by thesaurus.)

The project searchers listened to the tape of the user's problem and intent and formed their own opinion of the context. In addition, they indicated their own Internal Knowledge about the problem at hand. The summary of this data is presented in Table 8-6 which shows:

...the problem underlying 50% of the questions was considered by the project searcher to be quite well defined, in contrast to 58% by the users

...intent was considered by project searchers as "open to many avenues" for 50% of the questions, in contrast to 45% indicated so by users

...for 30% of the questions project searchers indicated that there was close to certainty that information requested could be found in public knowledge, in contrast to 60% indicated so by the users

...for 85% of the questions, project searchers considered themselves having quite low knowledge about the problem at hand, whereas 45% of the users believed they possessed high knowledge and 10% low knowledge

Thus, there were differences, to varying degrees, between project searchers and users in their respective assessments of context questions. The differences were not large except in internal knowledge and the existence of public knowledge. Project searcher admitted to considerably lower internal knowledge than did the users about the problem at hand. But, that should be expected. User estimation of the existence of public knowledge was much greater than the estimation made by project searchers.

The outside searchers also were asked to complete two context measures: public knowledge (what is the probability of finding information on the request) and internal knowledge (how much do you know about the question at hand). They could not judge problem definitions and the intent scales becasue they did not hear the taped problem and intent statements. (The 36 outside searchers searched on the basis of written questions.) Each question was searched by 5 searchers, i.e., 40 questions x 5 searches for a total of 200 searches. Thus the outside searchers provided 200 context scores. Detailed context scores for each searcher are shown in Appendix A.

Table 8-7 provides a summary value for the two context measures (public knowledge and internal knowledge) as scored by 36 outside searchers while searching the 40 questions. As can be seen:

...in about 58% of the scores (for those who scored), the outside searchers believed there was close to certainty that the information requested could be found in public knowledge, in contrast to 60% of users for their questions and 30% of the project searchers

...in about 60% of the cases, outside searchers considered themselves as having quite low knowledge about the problem at hand. In contrast, for 85% of the questions project searchers indicated low knowledge and 10% of the users indicated low knowledge while 45% of the users indicated high knowledge.

The measure on public knowledge where users, project searchers, and outside searchers gave their own estimate of the availability of information in public knowledge, showed the greatest disparity. Users thought almost the same as outside searchers, however, both differed significantly from project searchers.

Table 8-1

OCCUPATION OF USERS SUBMITTING QUESTIONS FOR SEARCHING (N users = 40)

Occupation	Number of Questions Submitted	Question Number
Faculty	19	Q005; Q009; Q011; Q013; Q016; Q017; Q019; Q020; Q021; Q024; Q026; Q027; Q028; Q029; Q030; Q031; Q032; Q034; Q036
Graduate Students	15	Q001; Q002; Q003; Q004; Q007; Q008; Q010; Q012; Q014; Q015; Q018; Q022; Q025; Q033; Q035
Industrial Affiliation	6	Q006; Q023; Q037; Q038; Q039; Q040
TOTAL	40	

Table 8-2

TYPE OF WORK FOR WHICH INFORMATION WAS REQUESTED (N questions = 40)

Type of Work	Number of Questions
Faculty Research	14
Graduate Study	17
Industrial Research	5
General	1
Other	3

Table 8-3

SUMMARY OF THE SUBJECT OF EACH OF THE 40 QUESTIONS TOGETHER WITH THE NUMBER OF THE DIALOG FILE ON WHICH THE QUESTION WAS SEARCHED

Question Number	
Q001	The relationship and communication processes between middle aged children and their parents (searched in DIALOG File11)
Q002	Design, structure, and organization including overall integration of the acute care nursing department in the hospital (searched in DIALOG File218)
Q003	Stereotypes which affect the diagnosis of child abuse by health care providers (searched in DIALOG File64)
Q004	Effects of controlled lung hyperinflations, before and after endotracheal suctioning, on the cerebrovascular status of adults with severe closed head injuries (searched in DIALOG File154)
Q005	Rules-of-thumb, industry by industry (searched in DIALOG File148)
Q006	Prevention of carbon dioxide crystal growth on the interior surfaces of reactors (searched in DIALOG File6)
Q007	Factors which impede strategic human resource management (searched in DIALOG File75)
Q008	Effects of an aerobic interval training program on the physical and psycho-social health of menopausal women (searched in DIALOG File 154)
Q009	Alternatives for delivery of human services other than the classical model of individual casework in an agency based office (searched in DIALOG File37)
Q010	Motivations of adults choosing to discontinue chemotherapy (searched in DIALOG File154)
Q011	Psycho-emotional and psycho-social responses of parents and surviving siblings to an infant's death due to Sudden Infant Death Syndrome (SIDS) (searched in DIALOG File154)
Q012	Chemical reactivity of silicon carbide and silicon nitride ceramic powders at low (room) temperatures especially in

	aqueous environments (searched in DIALOG File13)
Q013	Definition and measurement of effectiveness in non-profit human service organizations (searched in DIALOG File15)
Q014	Changes in the function of hospital information systems due to the advent of prospective payment systems (searched in DIALOG File151)
Q015	Occurrences, causes, treatment, and prevention of retrolental fibroplasia (searched in DIALOG File154)
Q016	Retirement activities including pre-retirement indicators of retirement activity patterns (searched in DIALOG File11)
Q017	Pumps and control systems for drug delivery in animal experiments and clinical applications (searched in DIALOG File5)
Q018	Managerial competencies especially as applied to physician-managers (searched in DIALOG File15)
Q019	Perceived impact of the 1977 Institute of Internal Auditors Standards (searched in DIALOG File75)
Q020	Presentation of financial statements, especially the disclosure requirement form of the SEC (searched in DIALOG File15)
Q021	Social support networks and the physical and mental health of never married older women (searched in DIALOG File37)
Q022	Space commercialization forecast (searched in DIAOG File108)
Q023	Sintered powder metal or powder metal parts infiltrated with copper or bronze (searched in DIALOG File32)
Q024	Meaning of the cat in Italian Renaissance (1450-1600) religious paintings (searched in DIALOG File191)
Q025	Relationship between oral and written language of basic writers (searched in DIALOG File1)
Q026	Policies of creating administrative agencies for purposes of compensating industrial workers accidentally killed or injured in Ohio or Ontario from 1915 to 1935 (searched in DIALOG File38)
Q027	Principles and design of miniature high pressure sensors (searched in DIALOG File13)
Q028	History from 1800 of University Circle in Cleveland

	focusing on philanthropy, city planning, and public vs. private development (searched in DIALOG File38)
Q029	Firing or sintering of ceramic material using microwave radiation (searched in DIALOG File8)
Q030	Creative evasion of censorship in South Africa (searched in DIALOG File71)
Q031	Budgeting, especially automated acquisition budgeting, in law libraries (searched in DIALOG File61)
Q032	Engineering properties and various utilizations of fly ash as a construction material (searched in DIALOG File8)
Q033	Volume-averaged equations used to determine friction-factors of 2-phase slurry flow in pipelines (searched in DIALOG File8)
Q034	Expert systems directed by the user and not by an inference engine (searched in DIALOG File13)
Q035	Music therapy for the chronically ill, especially cancer patients (searched in DIALOG File154)
Q036	Industrial policy in Austria and Western Europe related to technological innovation, restructuring of industry, the EEC, and corporatism (searched in DIALOG File90)
Q037	Training of employees on the right to know (RTK) laws, OSHA hazard compliance laws, chemical safety, and handling of hazardous materials (searched in DIALOG File16)
Q038	Future of document acquisition, cataloging, storage, and information dissemination in the automated technical reference library (searched in DIALOG File61)
Q039	Environment of a corporation as it affects organizational structure (searched in DIALOG File15)
Q040	Known or proposed techniques for bacterial cloning and the commercial activity surrounding the technology (searched in DIALOG File16)

Table 8-4

TYPE OF SEARCH AND RESTRICTIONS AS REQUESTED BY THE USERS FOR THEIR QUESTIONS (N question = 40)

	Number of Questions
Type of Search Requested	
Precise Search	2
Broad Search	36
Not Specified	2
Restrictions for Language of Articles Retrieved	
English Only	25
Any Language	15
Years to be Searched	
Last 5 Years	4
No Limits	25
Other Limits Specified	
Within Last 3 Years	1
Within Last 10 Years	4
Within Last 25 Years	5
Within Last 40 Years	1
DIALOG Databases Suggested	
None	32
1 - 2 Files Speficied	5
3 - 4 Files Specified	3

Table 8-5

SUMMARY OF VALUES IN CONTEXT MEASURES ASSIGNED BY USERS IN RELATION TO THEIR QUESTIONS (N questions = 40)

Context Measure	Number of Users Assigning the Given Value				
	1	2	3	4	5
Problem Definition	1	6	10	13	10
Intent	6	12	7	9	6
Public Knowledge	1	9	6	12	12
Internal Knowledge	0	4	18	15	3

Table 8-6

SUMMARY OF VALUES IN CONTEXT MEASURES ASSIGNED BY PROJECT SEARCHERS FOR THE QUESTION THEY SEARCHED. This represents the project searcher's view of the context as opposed to the user's view of their own question context as summarized in Table 8-5. (N questions = 40)

Context Measure	Number of Questions Assigning the Given Value By Project Searchers				
	1	2	3	4	5
Problem Definition	6	7	7	11	9
Intent	9	10	7	7	7
Public Knowledge	10	10	8	7	5
Internal Knowledge	24	10	4	0	2

Table 8-7

SUMMARY OF VALUES ON TWO CONTEXT MEASURES ASSIGNED BY OUTSIDE SEARCHERS IN RELATION TO THEIR SEARCHES (N searches = 200 = (40 questions X 5 searches for each))

Context Measure	Number of Searches Assigned the Given Value By Outside Searchers					
	Not Assigned	1	2	3	4	5
Public Knowledge	24	6	10	58	56	46
Internal Knowledge	12	71	52	34	28	3

9. BACKGROUND DATA ON SEARCHERS

9.1 Cognitive Scores

9.1.1 Overview

The study involved the following:

36 outside searchers (each of whom searched 5 or 6 questions of the 40 questions submitted)

3 project searchers (each of whom conducted 4 project searches)

1 analyst used on question classification only

---

40 searchers

[As explained, the project searches were done to test search strategies devised from different sources; they were labeled project search 1, 2, 3, and 4; these were based on: 1. taped problem statetment only; 2. taped problem statement plus the written question; 3. terms from the written question statement only (no elaboration); 4. terms from the written question plus elaboration through an appropriate thesaurus.]

Table 9-1 is used to list outside and project searchers by their code (instead of by name) so that the scores listed in Table 9-2, if desired, could be associated with the type of searchers.

Table 9-2 provides the test scores for 40 searchers. Scores were given for the Remote Associates Test (RAT), Employee Aptitude Survey (EAS), and seven scores within the Learning Style Inventory Test. These tests, together with the meaning of score numbers is given next.

9.1.2 Remote Associates Test

The Remote Associates Test is a test of semantic association. The test presents subjects with sets of three stimulus words and asks the subject to find a fourth word that is related to (or has something in common with) all three stimulus words, as in the following examples:

cookies	sixteen	heart	________	[sweet]
poke	go	molasses	________	[slow]

surprise line birthday ________ [party]

skunk kings boiled ________ [cabbage]

The test consists of 30 such matches to be made in 20 minutes. The score is a straight count of right answers; thus, RAT score of 16 means that the subject tested had 16 correct match words out of a possible 30.

Table 9-3 provides the distribution of RAT scores and mean values for 40 searchers. It shows that there are two searchers with 5 right matches, 4 with 6 right matches, etc. The mean number of right matches for 40 searchers was 13.

Note that the distribution in Table 9-3 shows two distinct peaks at 10 and at 18. Thus, the mean is not typical and the standard deviation does not represent the width of a "central peak". (The searcher code numbers can be viewed as a histogram.) This is true of many of the distributions found in this study. They were not nornal distributions, i.e., bell shaped, and the means have to be interpreted with caution.

9.1.3 Employee Aptitude Survey

The Employee Aptitude Test (EAS) is a series of 10 short tests that are used in business and industry for personnel selection. We have selected only one of these 10 tests: the Symbolic Reasoning Test. This is a 30 item test done in 5 minutes, designed to test deductive inference. It uses inequalities as test items. Each of the 30 items specifies a relationship of "A" to "B" to "C" as in the following example:

$A > B < C$

and asks if therefore

$A > C$ is true, false, or dont' know.

The test is also scored as a straight count of correct answers. Thus, a score of 10 means that the subject tested identified 10 correct answers out of 30.

Table 9-4 provides the distribution for EAS scores and mean values for 40 searchers. The mean number of correct answers for 40 searchers was 10, but the distribution also has more than one peak.

9.1.4 Learning Style Inventory

Theory. The Learning Style Inventory (LSI) is based on a theory that learning is an integrated, four stage process that involves the use of four different cognitive modes [5-3]:

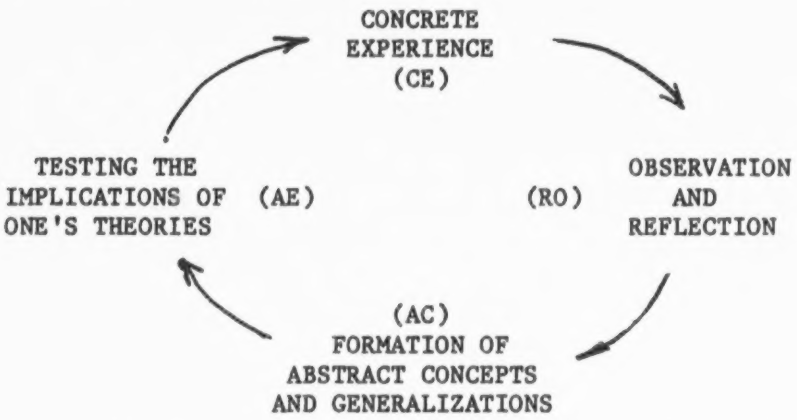
1. Concrete Experience (CE), the ability to involve oneself fully, openly and without reservation in new experiences;

2. Reflective Observation (RO), the ability to reflect on and observe these experiences from many different points of view;

3. Abstract Conceptualization (AC), the ability to generate concepts that integrate observations into logically sound theories;

4. Active Experimentation (AE), the ability to apply those theories to solve problems and make decisions.

The model is usually represented as:


CONCRETE
EXPERIENCE
(CE)
OBSERVATION
AND
REFLECTION
(RO)
(AC)
FORMATION OF
ABSTRACT CONCEPTS
AND GENERALIZATIONS
TESTING THE
IMPLICATIONS OF
ONE'S THEORIES
(AE)

The Learning Style Inventory (LSI) measures individual preferences for each of the four basic learning modes (CE, RO, AC, AE) and places an individual on a grid formed with Concrete Experience (CE) and Abstract Conceptualization (AC) forming the Y axis and Reflective Observation (RO) and Active Experimentation (AE) the X axis, as if they were drawn through the above representation of the learning model up and down and from left to right.

The theory recognizes that learning requires the use of all four modes, but that most people develop a preference for each contrasting pair, a preference that is known as a learning style. There are four predominant styles of learning, shown schematically in the following diagram:

	ACTIVE EXPERIMENTATION	REFLECTIVE OBSERVATION
CONCRETE EXPERIENCE	ACCOMODATION	DIVERGENCE
ABSTRACT CONCEPTUALIZATION	CONVERGENCE	ASSIMILATION

A preference for the modes of concrete experience and active experimentation indicates an *accomodative* style of learning. The theory explains that accomodators tend to solve problems in an intuitive trial-and-error way, relying heavily on others for information rather than on their own analytical ability.

A preference for the modes of concrete experience and reflective observation indicates *divergent* style of learning. Divergers excel at the ability to view concrete situations from many perspectives and to organize diverse elements into a single meaningful gestalt.

A preference for abstract conceptualization and active experimentation defines the *convergent* style of learning. A converger's knowledge is organized in such a way that he can focus it on specific problems through hypothetical deductive reasoning.

Finally, preferences for abstract conceptualization and reflective observation define the *assimilative* learning style. Assimilators excell at inductive reasoning, assimilating disparate observations into integrated explanations.

Test. *Learning Style Inventory* (LSI) is a test based on the above theory of learning. It is used to measure individual preference for each of the four basic learning modes (concrete experience (CE), reflective observation (RO), abstract conceptualization (AC), and active experimentation (AE)). The test form asks the respondent to rank in order from 1 to 4 a series of four statements in response to a question on how he/she learns. A 20 minute time period is allowed. There are no right or wrong answers. There are 12 sets of four statements to rank. Two examples are:

When I learn:

____ I like to deal with my feelings
____ I like to watch and listen
____ I like to think about ideas
____ I like to be doing things

I learn best from:

____ Personal relations
____ Observation
____ Rational theories
____ A chance to try out and practice

The LSI yields a total of six scores: one raw score for each of the four basic modes and two composite scores. The raw scores are obtained by summing the ranks indicated down the columns of the LSI. Each column represents a separate learning ability, arranged from left to right across the page in the following order: concrete experience (column 1), reflective observation (column 2), abstract conceptualization (column 3) and active experimentation (column 4). The raw scoring is done by simply adding all the rank numbers given by a respondent in a column. Because each value for a rank can be between 1 and 4, and there are 12 items in a column, the maximum score is 48 and the minimum is 12.

The two combination scores are obtained by subtracting a respondent's concrete experience score from the abstract conceptualization score (AC-CE), and the reflective observation score from the active experimentation score (AE-RO). The combination scores are used to determine a respondent's learning style. They indicate the extent to which the individual emphasizes abstractness over concreteness (AC-CE) and the extent to which he or she emphasizes action over reflection (AE-RO). The combination score values can range from -36 to +36.

In addition, a graph is made for the combination scores for visual identification of the person's learning style. The X axis is used to place the AC-CE composite scores, and the Y axis for the AE-RO scores. The point of interception between these two scores is used to place a respondent in one of the four quadrants, identifying the learning styles. The quadrants representing the four types of learning styles (labeled 1 to 4 in Tables 9-2 and 9-6) are as follows (see explanation for each type in the preceeding section):

1. Converger: left lower quadrant

2. Diverger: right upper quadrant

3. Assimilator: right lower quadrant

4. Accomodator: left upper quadrant

A person with a score of zero on either AC-CE or AE-RO is considered as indeterminate. The closer a data point is to the point where lines cross the more balanced the respondent's learning style, the farther into any corner, the more emphasized are the characteristics of the given learning style within the quadrant.

As mentioned, Table 9-2 provides the raw scores for the Learning Style Inventory for all searchers, together with composite scores and the type of learning style derived from the graph in Figure 9-1.

Table 9-5 provides the range and mean of the four basic scores (CE, RO, AC, and AE) and the combined scores (AC-CE and AE-RO) for all the searchers. As can be seen the abstract conceptualization mode of learning has the highest mean and the concrete experience the lowest.

Figure 9-1 is the graphic representation for the combined scores of all searchers. (The graph is derived from the combined scores in Table 9-2.) It shows the place of individual searchers in different quadrants, each quadrant representing a different style of learning.

Table 9-6 summarizes the data from Figure 9-1 showing the number of searchers with any given learning style and lists their search codes. As can be seen, 42% of the searchers were convergers, 25% were assimilators, 23% were accomodators, 5% were divergers, and 5% were indeterminate.

9.2 Online Background of Searchers

The searchers were asked (Form 3 Appendix H) to answer several questions about their online experience. The next two tables are compiled from this data.

Table 9-7 shows the DIALOG databases most frequently used by searchers. (The list of selected databases is given in Form 3, Appendix H.) Each searcher was asked to indicate seven databases from most frequently used (rank 1) to least used (rank 7). From the table we can see that the most frequently used databases are: ERIC (education), COMPENDEX (engineering), PsychInfo (psychology), PTS PROMPT (business), ABI/INFORM (business), MEDLINE (medicine), NTIS (government reports), PTS F&S Indexes (business), Sociological Abstracts, INSPEC (science and engineering) and Magazine Index (popular periodicals). A number of other databases from a variety of fields were mentioned. Thus, the searchers as a group had a diverse database background.

Table 9-8 shows the frequency of searching of DIALOG as indicated by the 40 searchers. As can be seen 30% reported using DIALOG daily, and another 33% twice a week. Seven percent reported using DIALOG once a week, while about 22% use it less than twice a month. Thus, some 70% of the searchers use DIALOG at least once a week. In other words, these were experienced, professional searchers.

Table 9-1

CODE NUMBERS USED FOR VARIOUS SEARCHERS AND FOR PROJECT SEARCHES (for use in conjunction with Table 9-2)

Type of Searcher	Number	Code Designation
Outside Searchers	36	S001 to S017; S021; S023 to S041
Project Searchers	3	S018, S019, S020
Analyst for Question Classification	1	S022

Designated Number	Project Search Devised From	Code Designation for Project Search Plus Project Searcher
1	User's taped problem statement only	S118, S119, S120
2	User's taped problem statement plus written question	S218, S219, S220
3	Words from written question only (no elaboration)	S318, S319, S320
4	Terms from written question plus thesaurus elaboration	S418, S419, S420

Table 9-2

COGNITIVE TEST SCORES FOR ALL SEARCHERS

Record#	SEAR_NO	RAT	EAS	CE	RO	AC	AE	AC-CE	AE-RO	LSI
1	001	16	11	27	30	23	40	-4	10	4
2	002	14	18	13	31	48	28	35	-3	3
3	003	16	7	33	17	31	39	-2	22	4
4	004	15	21	19	35	31	35	12	0	0
5	005	13	15	15	32	42	31	27	-1	3
6	006	19	21	22	33	41	24	19	-9	3
7	007	11	5	36	32	16	36	-20	4	4
8	008	10	14	23	32	30	35	7	3	1
9	009	17	5	21	30	29	40	8	10	1
10	010	11	13	18	35	35	32	17	-3	3
11	011	18	17	14	30	48	28	34	-2	3
12	012	18	10	19	38	41	22	22	-16	3
13	013	10	12	17	34	39	30	22	-4	3
14	014	19	14	36	44	25	15	-11	-29	2
15	015	8	5	17	31	48	24	31	-7	3
16	016	9	3	28	23	32	37	4	14	1
17	017	10	5	42	19	30	29	-12	10	4
18	018	6	9	21	32	44	23	23	-9	3
19	019	6	18	24	12	48	36	24	24	1
20	020	9	11	17	19	48	36	31	17	1
21	021	8	8	29	27	30	34	1	7	1
22	022	28	12	23	18	34	45	11	22	1
23	023	6	4	17	29	45	32	28	3	1
24	024	18	9	26	21	34	39	8	18	1
25	025	13	11	37	14	24	45	-13	31	4
26	026	10	8	25	33	19	43	-6	10	4
27	027	5	5	25	25	24	36	-1	11	4
28	028	14	8	33	31	25	31	-8	0	0
29	029	6	9	28	19	46	27	18	8	1
30	030	16	5	31	25	24	40	-7	15	4
31	032	21	5	16	21	44	39	18	18	1
32	033	11	5	24	24	26	46	2	22	1
33	034	18	7	34	24	17	45	-17	21	4
34	035	11	15	31	19	33	37	2	18	1
35	036	5	18	37	41	25	17	-12	-21	2
36	037	17	14	22	33	30	35	8	2	1
37	038	18	16	18	37	27	38	9	1	1
38	039	12	14	22	35	42	21	20	-14	3
39	040	10	9	27	23	28	42	1	19	1
40	041	19	8	21	28	36	35	15	7	1

LEGEND:

SEAR_NO=Searcher Number
RAT = Remote Associates Test
EAS = Employee Aptitude Survey
CE = Concrete Experience
RO = Reflective Observation
AC = Abstract Conceptualization
AE = Active Experimentation
AC-CE = Difference between AC and CE
AE-RO = Difference between AE and RO
LSI = Learning Style

Table 9-3

DISTRIBUTION OF REMOTE ASSOCIATES TEST (RAT) SCORES FOR ALL SEARCHERS (N searchers = 40; possible score range from 1 to 30)

Score	Number of Searchers	Searcher Code Number
5	2	S027, S036
6	4	S018, S019, S023, S029
8	2	S015, S021
9	2	S016, S020
10	5	S008, S013, S017, S026, S040
11	4	S007, S010, S033, S035
12	1	S039
13	2	S005, S025
14	2	S002, S028
15	1	S004
16	3	S001, S003, S030
17	2	S009, S037
18	5	S011, S012, S024, S034, S038
19	3	S006, S014, S041
21	1	S032
28	1	S022

MEAN : 13.03
STANDARD DEVIATION : 5.2

Table 9-4

DISTRIBUTION OF EMPLOYEE APTITUDE SURVEY (EAS) SCORES FOR ALL SEARCHERS
(N searchers = 40; possible score range from 1 to 30)

Score	Number of Searchers	Searcher Code Number
3	1	S006
4	1	S023
5	8	S007, S009, S015, S017, S027, S030, S032, S033
7	2	S003, S034
8	4	S021, S026, S028, S041
9	4	S018, S024, S029, S040
10	1	S012
11	3	S001, S020, S025
12	2	S013, S022
13	1	S010
14	4	S008, S014, S037, S039
15	2	S005, S035
16	1	S038
17	1	S011
18	3	S002, S019, S036
21	2	S004, S006

MEAN : 10.60
STANDARD DEVIATION : 4.965

Table 9-5

MEAN SCORES FOR LEARNING STYLE INVENTORY (LSI) FOR ALL SEARCHERS (N searchers = 40; possible range for CE, RO, AC, and AE from 12 to 48; for AC-CE and AE-RO from -36 to +36)

Learning Mode	Minimum	Maximum	Mean	Standard Deviation
(CE) CONCRETE EXPERIENCE	13	42	24.7	7.3317
(RO) REFLECTIVE OBSERVATION	12	44	27.9	7.4482
(AC) ABSTRACT CONCEPTUALIZATION	16	48	33.55	9.4134
(AE) ACTIVE EXPERIMENTATION	15	46	33.675	7.7736
Combined Scores				
AC-CE	-20	35	12.850	11.6102
AE-RO	-29	31	9.725	10.6168
LS - Learning Style (Quadrant)	1	4	2.175	1.3375

Table 9-6

DISTRIBUTION OF LEARNING STYLES FOR ALL SEARCHERS. Derived from combined scores as plotted in Figure 9-1. (N searchers = 40; N learning styles = 4 plus indeterminate)

Learning Style and Code Used	Number of Searchers	Searcher Code Number
0 - INDETERMINATE	2	S004, S028
1 - CONVERGER	17	S008, S009, S016, S019, S020, S021 S022, S023, S024, S029, S032, S033, S035, S037, S038, S040, S041
2 - DIVERGER	2	S014, S036
3 - ASSIMILATOR	10	S002, S005, S006, S010, S011, S012, S013, S015, S018, S039
4 - ACCOMODATOR	9	S001, S003, S007, S017, S025, S026, S027, S030, S034

Figure 9-1

GRAPHIC REPRESENTATION FOR THE COMBINED SCORES ON THE LEARNING STYLE INVENTORY PLACING EACH SEARCHER IN A QUADRANT INDICATING A GIVEN LEARNING SYLE (N searchers=40)

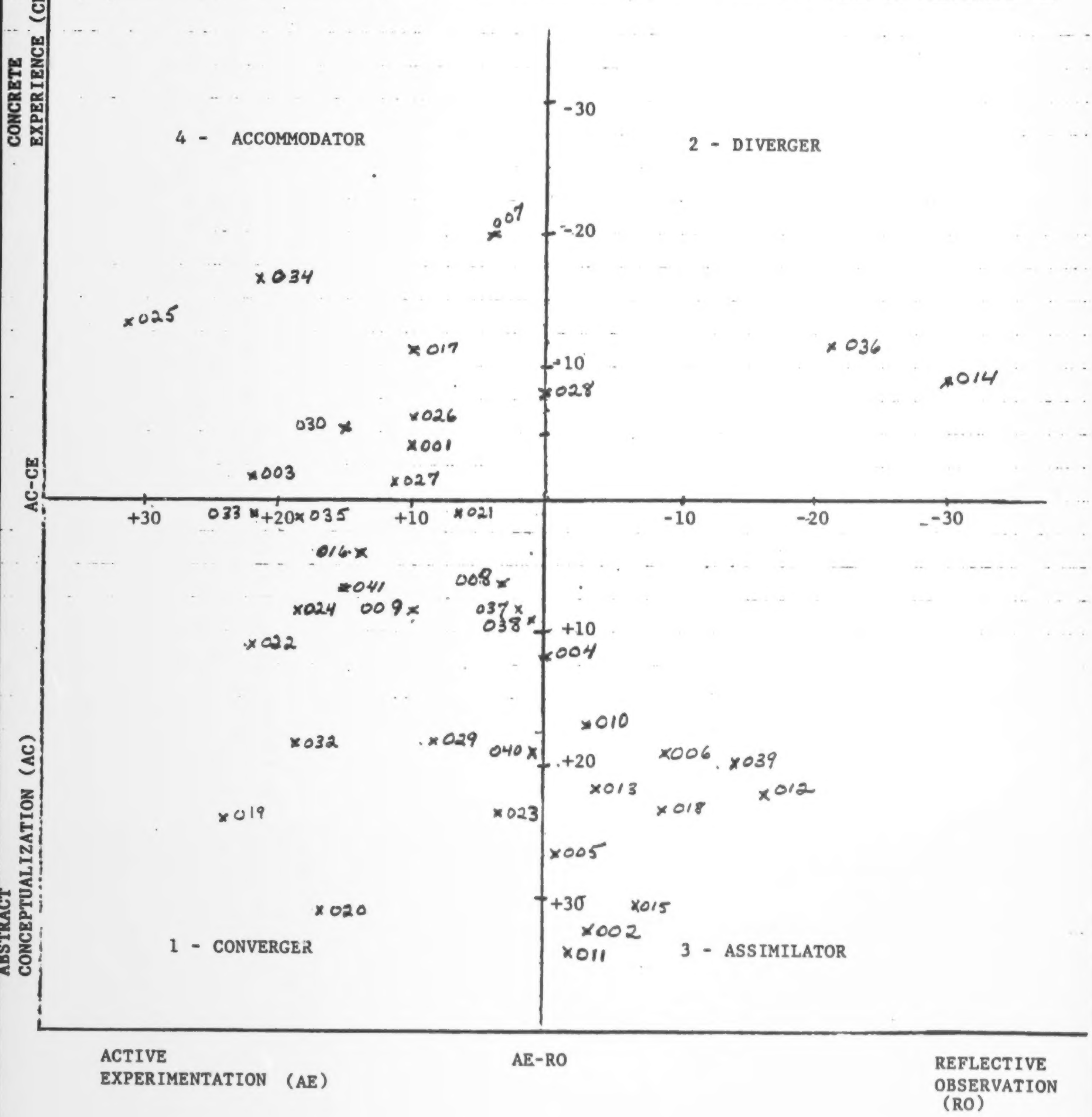


Table 9-7

DIALOG DATABASES RANKED AS MOST OFTEN SEARCHED BY SEARCHERS
(N searchers = 40; they indicated up to 7 databases; most frequently searched rank = 1, least frequently rank = 7)

	Number of Searchers Selecting Frequency Rank						
File Number and Name	1	2	3	4	5	6	7
001 - ERIC	10	2	2	0	2	0	2
008 - COMPENDEX	9	5	3	1	0	0	0
011 - PsychInfo	4	3	3	3	0	0	1
016 - PTS PROMPT	4	4	4	1	3	0	0
015 - ABI/INFORM	3	1	4	1	1	1	4
154 - MEDLINE	3	3	2	0	0	1	0
006 - NTIS	2	5	3	3	1	0	4
018 - PTS F&S INDEXES	2	2	2	1	0	2	0
132 - STANDARD AND POOR'S NEWS	1	0	0	0	1	2	0
037 - SOCIOLOGICAL ABSTRACTS	1	1	2	0	2	2	2
032 - METADEX	1	1	1	1	1	0	1
013 - INSPEC	0	4	2	3	2	3	1
218 - NURSING AND ALLIED HEALTH	0	2	0	0	0	0	0
047 - MAGAZINE INDEX	0	1	2	3	4	2	3
148 - TRADE AND INDUSTRY INDEX	0	1	0	4	0	1	0
086 - MENTAL HEALTH ABSTRACTS	0	1	0	1	0	1	0
075 - MANAGEMENT CONTENTS	0	1	0	3	2	1	0
033 - WORLD ALUMINUM ABSTRACTS	0	1	0	0	0	0	0
005 - BIOSIS	0	0	1	1	0	0	1
111 - NATIONAL NEWSPAPER INDEX	0	0	3	2	2	3	2
161 - OCCUPATIONAL SAFETY AND HEALTH	0	0	1	1	0	0	0
071 - MLA BIBLIOGRAPHY	0	0	1	1	0	0	0
049 - PAIS INTERNATIONAL	0	0	1	0	1	0	0
014 - ISMEC	0	0	1	0	1	0	0

Additional DIALOG databases ranked 4 to 7 by 1 or 2 searchers were: (4) 036, 035; (5) 041, 051, 089, 171, 076, 233, 007, 064; (6) 291, 275, 039, 040, 233, 064; (7) 139, 097, 238, 038

Table 9-8

FREQUENCY OF DIALOG SEARCHING BY SEARCHERS IN THE STUDY (N searchers = 40 composed of 36 outside searchers, 3 project searchers & 1 analyst for question classification)

Frequency of Use and Code	Searchers at That Frequency No.	%	Searcher Number
1. Less than twice a month	9	22.5	S012, S013, S016, S018, S019, S023, S024, S028, S032
2. Twice a month	3	7.5	S015, S022, S034
3. Once a week	3	7.5	S001, S020, S038
4. Twice a week	13	32.5	S002, S006, S007, S008, S010, S011, S017, S025, S027, S029, S030, S036, S037
5. Daily	12	30	S003, S004, S005, S009, S014, S021, S026, S031, S033, S035, S039, S040

10. EFFICIENCY CHARACTERISTICS OF SEARCHES

A series of measures (defined in Section 5.5.5) were used to characterize a search on the basis of efficiency: time (online and offline) and structure (number of commands, search terms, and cycles). Both efficiency and structure have bearing on and can be translated into costs.

The elements of time and structure characterize a search independently from evaluations of retrieved items. These can be derived and studied without viewing the results. Thus, they are presented here before the results on items retrieved and the effectiveness measures. The efficiency measures are objective measures of a search and are used for correlation with other measures, particularly those involving effectiveness.

In the three tables in this chapter and all of the tables which follow, we are using the abbreviation for variables as defined in Chapter 7, Table 7-1, where a detailed definition of each variable and measure used is presented. In other words, instead of a repeat of the definition of the variables and measures, a reference is made to the code book and only the title of the measure is given.

The three tables in this chapter contain the mean, standard deviation, and the minimum and maximum values for the five efficiency measures for the searches.

Table 10-1 contains efficiency measures for the 200 searches done by the outside searchers (40 questions X 5 searches of each).

Table 10-2 contains efficiency measures for the 160 searches done as project searches (40 questions X 4 project searches each).

Table 10-3 contains efficiency measures for all 360 searches, combining outside and project searches.

As can be seen, the range is quite wide and the standard deviation quite large. Differences exist between the outside and project searches, however, the differences are not large and they are not statistically significant.

As can be seen, on the average, per search, the searchers used in the neighborhood of:

... 15 commands

... 3 cycles

... 10 search terms

... 14 minutes of online time

... 13 minutes of preparation time

... 27 minutes total time

But, the ranges for a search varied from:

... 2 to 50 commands

... 1 to 14 cycles

... 1 to 61 search terms

... half a minute to 74 minutes online time

... 4 to 50 minutes preparation time, and

... 6 to 117 minutes total time

These general figures were not (and cannot be) used for correlation between efficiency and effectiveness measures. In the statistical analysis actual figures for each question and search were used. Correlations were done and conclusions were derived on a search by search basis.

The figures presented here provide only a general overview of the efficiency characteristics of searches in this study.

Table 10-1

EFFICIENCY MEASURES FOR OUTSIDE SEARCHES (N searches = 200)

Variable	Minimum	Maximum	Mean	Standard Deviation
SVI	3	45	15.725	8.1277
SVJ	1	14	3.73	2.2544
SVK	1	61	10.22	7.0931
SVK	0.036	1.240	0.2641	0.1792
SVM	0.033	0.833	0.2500	0.1576
SVN	0.1540	1.9560	0.5141	0.2929

SVI = Number of Commands Used in a Search
SVJ = Number of Command Cycles Used in a Search
SVK = Number of Search Terms Used in a Search
SVL = Online Connect Time Used for a Search
SVM = Preparation Time Used for a Search
SVN = Total Time Used for a Search

Table 10-2

EFFICIENCY MEASURES FOR PROJECT SEARCHES (N searches = 160)

Variable	Minimum	Maximum	Mean	Standard Deviation
SVI	2	50	12.9937	6.9368
SVJ	1	8	2.9812	1.5025
SVK	1	49	10.4687	6.9688
SVL	0.006	0.8110	0.2046	0.1192
SVM	0.016	0.6670	0.1773	0.1093
SVN	0.1050	0.8940	0.3820	0.1712

SVI = Number of Commands Used in a Search
SVJ = Number of Command Cycles Used in a Search
SVK = Number of Search Terms Used in a Search
SVL = Online Connect Time Used for a Search
SVM = Preparation Time Used for a Search
SVN = Total Time Used for a Search

Table 10-3

EFFICIENCY MEASURES FOR ALL SEARCHES (N searches = 360)

Variable	Minimum	Maximum	Mean	Standard Deviation
SVI	2	50	14.511	7.732
SVJ	1	14	3.397	1.989
SVK	1	61	10.331	7.030
SVL	0.006	1.240	0.238	0.158
SVM	0.016	0.833	0.218	0.143
SVN	0.1050	1.9560	0.455	0.255

SVI = Number of Commands Used in a Search
SVJ = Number of Command Cycles Used in a Search
SVK = Number of Search Terms Used in a Search
SVL = Online Connect Time Used for a Search
SVM = Preparation Time Used for a Search
SVN = Total Time Used for a Search

11. ITEMS RETRIEVED

This chapter contains the summary of items retrieved for the 40 questions used in the study. The items are summed up in two ways:

1. Sum of all items retrieved over all searches: number of items retrieved by each search summed over all searches for 40 questions. Duplicates of identical items retrieved for the same question were not eliminated in this sum.

2. Sum of unique items over all searches: this involves the number of items retrieved after duplicates were eliminated. As mentioned, for each question a union of items retrieved was created by merging the output from all nine searches and eliminating duplicates. This sum of unique items consists of the sum of these unions for 40 questions.

The difference between the two sums is the same as the difference between tokens and types in word counts. To provide an example, let's say that in searching the same question one search retrieved 30 items and the second search provided 35 items. When the two sets resulting respectively from the two searches are compared, 10 items are found to be identical between the two. We merged the two sets of retrieved items into a union set and eliminated duplicates. While the total number of items retrieved (sum over searches) for the two searches is 65, the union (sum of unique items) is 55 (10 of the same items retrieved by both searches plus 20 items unique to the first search plus 25 items unique to the second search).

All items retrieved were used to analyze the variables connected with searches and searchers and the unique items retrieved were used to analyze variables connected with the question.

Table 11-1 provides the sum of all items retrieved by all searches before elimination of duplicates and the sum of unique items retrieved after elimination of duplicates. As mentioned, if a search exceeded 150 items, only the first 150 were sent to the users for evaluation. The table shows the number of items evaluated and not evaluted by the users, and total retrieved items for all 360 searchers for 40 questions. Only the evaluated items were used for statistical analysis; thus, with the exception of Table 11-4 where all retrieval data is given on a question by question basis, the number of retrieved but not evaluated items and the total retrieval (evaluated plus not evaluated items) is not treated any place else.

Table 11-2 breaks down the sum of all items retrieved (before elimination of duplicates) for all searches by (i) outside searches, (ii) project searches, and (iii) total searches and provides the number of items judged by users as relevant, partially relevant and not relevant. These were used to establish a benchmark for analysis of variables related to the search and to searching (variables 2 to 15 and 82 to 89 in Table 7-1).

Table 11-3 breaks down the sum of the unions of unique items retrieved (after elimination of duplicates) for all searches and for outside searches by the same categories as above and by the relevance evaluations by users. These were used to establish a benchmark for analysis of variables related to questions (variables 16 to 28, and 52 to 59).

As can be seen:

... the 360 searches for 40 questions retrieved all together 17,695 items, of these, 11,796 items were unique and 5899 items were retrieved by more than one search, i.e., the overlap was about 33%.

... Of the 17,695 retrieved items by all searches, 8956 (or 51%) were evaluated, the rest were not. The not evaluated items belong to the set of items exceeding 150 per question. These 8956 evaluated items were used in the analysis of search and searcher. The not evaluated items were not used in any analysis.

... Of the 11,796 unique items retrieved, 5411 (or 46%) were evaluated by users. These 5411 items were used in analysis of variables related to questions.

... To recapitulate, the sum of items retrieved (counting search by search for 360 searches) before elimination of duplicates consisted of 8956 evaluated items and after elimination of duplicates, the total number of evaluated items was 5411 (counting question by question the items sent to users). This means that 3545 (8956 minus 5411) items were retrieved more than once and the overlap in retrieval of evaluated items was about 40%.

... Of the 8956 items retrieved by all searches (before elimination of duplicates), about 54% were the result of 200 outside searches and 46% the result of 160 project searches.

... Of 8956 items retrieved by all searches, the users judged approximately 31% as relevant, 28% as partially relevant, and 41% as not relevant.

... Of the 5411 unique items retrieved, about 25% were judged relevant, 27% partially relevant, and 48% not relevant.

Table 11-4 provides the retrieval data on a question by question basis. The designation for variables in the table are taken from the code book in Table 7-1. The table includes:

1. Question number

2. File number of the DIALOG database used to search the question

3. QVA = Number of relevant items retrieved for a question

4. QVB = Number of partially relevant items retrieved for a question

5. RpR = Sum of the number of relevant and partially relevant items retrieved for a question

6. QVE = Number of not relevant items retrieved for a question

7. QVD = Total number of evaluted items retrieved for a question

8. QVE = Number of not evaluated items retrieved for a question

9. QVF = Total number of items retrieved for a question

Table 11-5 is devoted to ranges, means and standard deviations of retrieved and evaluated items by different sets of searches:

1. for all items retrieved (before elimination of duplicates) for all searches (8956 items retrieved for 360 searches)

2. for all items retrieved by outside searches (4841 items retrieved for 200 searches)

3. for all items retrieved by project searches (4115 items for 160 searches)

Table 11-6 shows ranges, means and standard deviation for unique items retrieved (after elimination of duplicates) for all searches (5411 items for 360 searches).

A range, mean, and standard deviation are provided for the following data in the two tables:

1. SVA = Number of relevant items retrieved by a search of a question

2. SVB = Number of partially relevant items retrieved by a search of a question

3. SVC = Number of not relevant items retrieved by a search of a question

4. SVD = Total number of items retrieved by a search of a question and evaluated by the user

5. SVE = Number of items retrieved by a search of a question but not evaluated by the user

6. SVF = Total number of items retrieved by a search of a question

From now on we are providing the legend for variables under discussion in the related tables only. We provided them in the text in this chapter to give an example of how the data are described in the tables and chapters that follow.

As can be seen, the range of all values varies a lot. The average number of items retrieved for all searches is about 49, of which about 50% were evaluated and 50% were not evaluated. The average number of relevant items for all searches was about 8, partially relevant about 7, and not relevant about 10. The means were somewhat higher for outside searches than they were for project searches, but the ranges for outside searches were much wider.

When considering questions (i.e., the number of unique items retrieved for a question when duplicates were eliminated), the ranges were also wide. The mean number for all unique items retrieved per question was 295 of which about 135 (46%) were evaluated. Among items evaluated, means of the judgements were about 34 relevant, 36 partially relevant, and 65 not relevant items per question.

Table 11-1

TOTAL NUMBER OF EVALUATED AND NOT EVALUATED ITEMS RETRIEVED BY ALL SEARCHES (N searches = 360)

	Evaluated	Not Evaluated	Total
All items including duplicates	8956	8739	17,695
All unique items excluding duplicates	5411	6385	11,796

Table 11-2

USER RELEVANCE JUDGEMENT ON ALL ITEMS RETRIEVED AND EVALUATED (including duplicates) (N items = 8956; N all searches = 360; N outside searches = 200; N project searches = 160)

User Judgement	Retrieved by Outside Searches No.	%	Retrieved by Project Searches No.	%	All Searches No.	%
Relevant	1378	15.4	1371	15.3	2749	30.7
Partially Relevant	1326	14.8	1212	13.5	2538	28.3
R + pR	2704	30.2	2583	28.8	5287	59.0
Not Relevant	2137	23.9	1532	17.1	3669	41.0
TOTAL	4841	54.1	4115	45.9	8956	100

Table 11-3

USER RELEVANCE JUDGEMENTS ON UNIQUE ITEMS RETRIEVED (excluding duplicates) FOR ALL SEARCHES AND FOR OUTSIDE SEARCHES (N unique items = 5411; N all searches = 360; N outside searches = 200)

The number of unique (or distinct) items retrieved by outside searches was used in several analyses, but the number of unique items retrieved for project searches was not used, so it is not reported here. An additional reason for not reporting it is to avoid confusion. Unique items for outside searches plus unique items for project searches add up to more than 5411 (total unique), because 5411 is a union and not a sum of the two values. (E.g., the same item could be unique in the set of outside searches and unique in the set of project searches, yet it is still only one item and when the two sets are merged it will be counted as one item not two.)

User Judgement	Retrieved by Outside Searches No.	%	Retrieved by All Searches No.	%
Relevant	924	25.1	1343	24.8
Partially Relevant	972	26.3	1448	26.7
R + pR	1896	51.4	2791	51.5
Not Relevant	1793	48.6	2620	48.5
TOTAL	3689	100	5411	100

Table 11-4

RETRIEVED AND EVALUATED ITEMS FOR EACH QUESTION (N questions = 40)

Question Number	DIALOG File Searched	QVA	QVB	RpR	QVC	QVD	QVE	QVF
001	011	27	46	73	75	148	626	774
002	218	37	36	73	156	229	0	229
003	064	36	47	83	68	151	272	423
004	154	60	58	118	33	151	8	159
005	148	16	23	39	48	87	0	87
006	006	11	5	16	134	150	88	238
007	075	70	39	109	40	149	335	484
008	154	2	5	7	54	61	0	61
009	037	18	48	66	84	150	495	645
010	154	4	15	19	130	149	310	459
011	154	9	25	34	115	149	161	310
012	013	6	21	27	121	148	90	238
013	015	7	36	43	106	149	14	163
014	151	35	71	106	51	157	2	159
015	154	28	86	114	36	150	172	322
016	011	25	37	62	108	170	0	170
017	005	36	26	62	88	150	377	527
018	015	66	38	104	46	150	612	762
019	075	27	49	76	74	150	52	202
020	015	26	43	69	81	150	161	311
021	037	19	6	25	77	102	0	102
022	108	15	135	150	0	150	365	515
023	032	29	9	38	51	89	0	89
024	191	1	4	5	30	35	0	35
025	001	30	26	56	94	150	430	580
026	038	37	39	76	8	84	0	84
027	013	35	69	014	46	150	58	208
028	038	5	23	28	39	67	0	67
029	008	36	34	70	80	150	77	227
030	071	57	25	82	13	95	0	95

Continued on next page

Table 11-4 cont.

Question Number	DIALOG File Searched	QVA	QVB	RpR	QVC	QVD	QVE	QVF
031	061	14	15	29	85	114	0	114
032	008	113	19	132	18	150	298	448
033	008	44	57	101	49	150	123	273
034	013	10	39	49	100	149	207	356
035	154	31	20	51	14	65	0	65
036	090	62	49	111	39	150	57	207
037	016	78	18	96	54	150	69	219
038	061	79	29	108	42	150	595	745
039	015	26	38	64	102	166	0	166
040	016	77	40	117	32	149	331	480
		1343	1448	2791	2620	5411	6385	11,796

QVA = Total Number of Relevant Items Retrieved for a Question
QVB = Total Number of Partially Relevant Items Retrieved for a Question
RpR = Total Number of Relevant Plus Paritally Relevant Items Retrieved for a Question
QVC = Total Number of Not Relevant Items Retrieved for a Question
QVD = Total Number of Evaluated Items Retrieved for a Question
QVE = Total Number of Not Evaluated Items Retrieved for a Question
QVF = Total Number of Items Retrieved for a Question

Table 11-5

RANGE OF VALUES, MEAN, AND STANDARD DEVIATION FOR ALL ITEMS RETRIEVED (including duplicates) BY ALL SEARCHES (N items = 8956; N all searches = 360; N outside searches = 200; N project searches = 160)

	Variable	Minimum	Maximum	Mean	Standard Deviation
ALL SEARCHES	SVA	0	86	7.636	10.749
	SVB	0	113	7.050	10.917
	SVC	0	89	10.192	13.886
	SVD	0	125	24.878	24.535
	SVE	0	541	24.311	54.498
	SVF	0	656	49.189	70.325
	Variable	Minimum	Maximum	Mean	Standard Deviation
OUTSIDE SEARCHES	SVA	0	58	6.890	9.708
	SVB	0	61	6.630	9.787
	SVC	0	70	10.684	13.762
	SVD	0	118	24.204	23.900
	SVE	0	541	25.035	62.664
	SVF	0	656	49.239	77.346
	Variable	Minimum	Maximum	Mean	Standard Deviation
PROJECT SEARCHES	SVA	0	86	8.568	11.887
	SVB	0	113	7.575	12.195
	SVC	0	89	9.575	14.057
	SVD	0	125	25.718	25.357
	SVE	0	210	23.406	42.306
	SVF	1	294	49.125	60.654

SVA = Number of Relevant Items Retrieved by a Search
SVB = Number of Partially Relevant Items Retrieved by a Search
SVC = Number of Not Relevant Items Retrieved by a Search
SVD = Total Number of Items Retrieved by a Search and Evaluated by the User
SVE = Items Retrieved by a Search but Not Evaluated by the User
SVF = Total Number of Items Retrieved by a Search of a Question

Table 11-6

RANGE OF VALUES, MEAN, AND STANDARD DEVIATION FOR UNIQUE ITEMS RETRIEVED (excluding duplicates) BY ALL SEARCHES (N items = 5411; N searches = 360)

Variable	Minimum	Maximum	Mean	Standard Deviation
QVA	1	113	33.575	25.322
QVB	4	135	36.200	24.389
QVC	0	156	65.500	37.325
QVD	35	229	135.275	36.271
QVE	0	626	159.825	191.330
QVF	35	774	295.100	206.135

QVA = Total Number of Relevant Items Retrieved for a Question
QVB = Total Number of Partially Relevant Items Retrieved for a Question
QVC = Total Number of Not Relevant Items Retrieved for a Question
QVD = Total Number of Evaluated Items Retrieved for a Question
QVE = Total Number of Not Evaluated Items Retrieved for a Question
QVF = Total Number of Items Retrieved for a Question

12. EFFECTIVENESS AND OVERLAP OF SEARCHES

The effectiveness measures are based on two criteria: relevance and utility. Users judged the relevance of each item retrieved and the utility of the search output as a whole. The relevance based measures are recall and precision (Section 5.5.3) and the five utility based measures are: overall worth, dollar value, time spent on evaluation, contribution to problem resolution and satisfaction (Section 5.5.4 and Table 12-4 below). Recall and precision pertain to individual items in a search, and utility measures to the aggregate of all items submitted to the user in response to his/her question.

12.1 Recall and Precision

Recall was established here as a fraction of relevant or partially relevant items in a search (R + pR) in relation to all R + pR items in the union of all nine searches for a question. Precision was measured in two ways:

1. Precision for a search (SVH) - fraction of relevant items in a given search in relation to all items retrieved by that search

2. Precision for a question (QVH) - fraction of relevant items in relation to all items submitted to the user, i.e., in relation to the union output of the nine searches for a question

In other words, precision measures: (i) the effectiveness of the retrieval of each search for a question, and (ii) the effectiveness of retrieval of all searches together. Recall measures the effectiveness of retrieval of each search for a question only. Recall for all searches for a question (i.e., for the union of retrieval from nine searches) cannot be established becasue we do not know what other relevant items were left unretrieved in the file. While precision is an absolute measure, recall is a comparative measure among the nine searches for a question.

Table 12-1 provides the range, mean and standard deviation of recall (SVG) and precision (SVH) for all searches for the 40 questions. Table 12-2 provides the range and mean of recall (SVG) and precision (SVH) for the nine searches for each question, on a question by question basis.

Table 12-3 provides the range, mean and standard deviation of overall precision (QVH) for all questions together with the list of question numbers falling into a given range. This list could be viewed as a histogram identifying peaks and valleys at different ranges.

As mentioned before, the mean values presented have to be interpreted with caution, because the distributions are not normal (bell shaped with one peak). As can be seen from the histogram in Table 12-3, there are several different peaks and the mean precision of 51% falls at one of the least represented values. This mean value is like saying that the population center (mean) of the U.S. is someplace in the West where in fact very few people live, or like saying when one person ate a meal and the other did not that on the average each had half a meal. We have been reluctant to provide means because they can be easily misinterpreted: we are providing them anyway because of expectations. We are also, therefore, including these notes of caution.

As can be seen:

... the average recall for all searches was about 22% and the average precision about 57%

... the outside searches did somewhat poorer on recall and better on precision than the project searches

... the ranges of precision and recall for the nine searches for a question varied widely for almost all questions; there were very few questions with a narrow range. The searches for the same question differed considerably in effectiveness measures.

Figure 12-1 provides a plot of recall versus precision for all 360 searches. For each search, recall and precision are plotted against each other as one point, resulting in 360 points plotted in the graph. Two linear regression lines are plotted: 1. for precision as an independent variable and recall as the dependent variable (connect Y to Y on the vertical lines), and 2. for recall as an independent variable and precision as the dependent variable (connect X to X on the horizontal lines).

The results are quite remarkable. An enormous amount of scatter is shown. It is often said that there is an inverse relation between recall and precision. In real search situations it has never been clear that this relationship should exist, particularly in cases where the size of the retrieved set is limited by economic factors. With our data, no matter which variable is chosen as independent, there is a positive relationship between recall and precision: as one rises so does the other. This directly contradicts many established results including the Cleverdon Law on the inverse relationship between recall and precision.

We did not study why the observed relationship between recall and precision occurred in our data. We have only observed what the data from the study showed the relationship was for 360 searches retrieving 8,956 items for 40 questions. We can only speculate, along with everyone else, why our observation flies in the face of others.

12.2 Utility Measures

The text and scales for the five utility measures are given in Table 12-4, along with the number of users assigning the given value on the scale.

Table 12-5 is a comparison table providing further analysis of the data, that is the range, mean and standard deviation of the utility measures assigned by the users.

Tables 12-6 to 12-10 are each, in turn, devoted to the five utility measures which provided, for each value on the given scale, the number of questions for which the value was assigned and the actual question numbers involved. Table 12-6 is devoted to time spent in evaluation; Table 12-7 to dollar value assigned; Table 12-8 to worth of a search; Table 12-9 to contribution to problem resolution; and Table 12-10 to overall satisfaction.

As can be seen:

... 70% of the users considered their participation in the project and the information that resulted as worth "much more" or "somewhat more" than the time it took; 20% said it was worth "about the same" as the time it took, and 10% said it was worth "less" than the time it took

... 45% of the users could not assign a dollar value to the information provided; 28% assigned less than $50; 20% assigned between $50 and $200; and 7% assigned over $200

... 25% of the users spent less than a half hour on evaluation; 30% spent between one and two hours; and 45% spent more than two hours

... about 48% of the users scored the contribution made by the information supplied to the resolution of their problem as high (upper two points); 20% were in the middle and 32% were in the lower two points on the scale. Actually, only two users (5%) said "nothing" was contributed.

... 58% of the users scored their satisfaction with the results of the search high (upper two points); 22% scored in the middle; and 20% scored on the lowest two points. Actually, only two users (5%) said they were "dissatisfied".

It is of interest to note that the problem resolution scores did not parallel the satisfaction scores. Six (10%) more users scored satisfaction high than scored problem resolution high, and five (12%) more users scored problem resolution low than scored satisfaction low. This shows that users do distinguish between the two concepts as measures.

12.3 Overlap in Search Terms and Items Retrieved

Two types of overlap were studied:

1. Search term: degree of agreement in selection of search terms between each pair of searchers searching the same question

2. Items retrieved: degree of agreement in retrieval of items between each pair of searchers searching the same question. These were subdivided into degree of agreement on all items retrieved (relevant, partially relevant, nonrelevant) and on only relevant or partially relevant items retrieved

These measures were described in this report in Sections 5.4.3 and 5.4.4 and will be discussed further in Chapter 15 which reports on the comprehensive statistical analyses which were done. Only the basic data are given here.

Table 12-11 provides the means and standard deviation for the degree of overlap in: (i) search terms, (ii) all retrieved items (relevant, partially relevant, and nonrelevant), and (iii) retrieved relevant or partially relevant items. Again, the actual distributions are skewed (in each of these distributions toward zero) and the mean has to be interpreted with caution.

The number of comparisons used to derive the means and the degree of overlap (and other statistics in Chapter 15) was 800. The 800 figure was established as follows: for each question there were five outside searches, each search was compared four times (e.g., search 1 was compared with search 2, 3, 4, and 5 but not with itself) and there were 40 questions. Thus, the total was 5 searches X 4 comparisons X 40 questions = 800.

As can be seen from the table, the means for the degree of overlap for both term selection and retrieved items are quite low. Mean agreement on terms was 27%, on all items retrieved 16%, and on relevant or partially relevant items 18%. The means for the two types of overlap, of search terms and of items retrieved, are significantly different. Further analysis of that difference is provided in Chapter 15. The searches for the same question done by different searchers differed considerably in both search term selection and in items retrieved. The differences were ever so slightly less (2%) when only relevant or partially relevant items were considered.

The low degree of overlap among searches in both term selection and items retrieved is one of the most significant observations of the study.

Table 12-1

RANGE, MEAN, AND STANDARD DEVIATION OF RECALL AND PRECISION FOR ALL SEARCHES (N all searches = 360; N outside searches = 200; N project searches = 160)

	Measure	Minimum	Maximum	Mean	Standard Deviation
ALL SEARCHES	SVG	0	0.895	0.2193	0.213
	SVH	0	1.000	0.572	0.335

	Measure	Minimum	Maximum	Mean	Standard Deviation
OUTSIDE SEARCHES	SVG	0	0.8080	0.1969	0.1992
	SVH	0	1.0000	0.5740	0.3447

	Measure	Minimum	Maximum	Mean	Standard Deviation
PROJECT SEARCHES	SVG	0	0.8950	0.2470	0.2272
	SVH	0	1.0000	0.6120	0.3199

SVG = Search recall
SVH = Search precision

Table 12-2

RECALL AND PRECISION RANGE AND MEAN FOR THE NINE SEARCHES ON EACH QUESTION (N questions = 40; N searches per question = 9)

Question Number	RECALL (SVG) Minimum	Maximum	Mean	PRECISION (SVH) Minimum	Maximum	Mean
001	.013	.562	.1322	.286	1.0	.493
002	0.0	.507	.2313	0.0	.720	.318
003	0.0	.506	.1431	0.0	1.0	.549
004	.042	.441	.1683	.556	.878	.781
005	0.0	.564	.2448	0.0	.677	.447
006	0.0	.688	.2014	0.0	.133	.106
007	0.0	.440	.1741	0.0	.800	.731
008	0.0	.857	.4443	0.0	.154	.114
009	.045	.561	.1647	.100	1.0	.440
010	0.0	.895	.2275	0.0	.600	.127
011	.029	.676	.2317	.225	.500	.228
012	.074	.481	.2137	.090	.500	.182
013	.046	.488	.2325	.267	1.0	.288
014	.009	.698	.2398	.030	.841	.675
015	.184	.772	.4853	.746	.886	.760
016	.080	.661	.2363	.178	.625	.364
017	.016	.500	.1413	.250	1.0	.413
018	0.0	.808	.1367	0.0	.744	.693
019	0.0	.472	.2514	0.0	.900	.506
020	.014	.623	.1431	.250	.500	.460
021	0.0	.560	.1644	.066	1.0	.245
022	.013	.833	.1924	1.0	1.0	1.0
023	.052	.684	.2715	.200	.750	.426
024	0.0	.600	.3777	0.0	.333	.142
025	0.0	.554	.1406	0.0	1.0	.373
026	0.0	.711	.1592	0.0	1.0	.904
027	.019	.587	.2852	.645	.947	.693
028	0.0	.643	.3093	0.0	.818	.417
029	.042	.543	.2332	.359	1.0	.666
030	.012	.793	.3628	.800	1.0	.863

Continued on next page

Table 12-2 Cont.

Question Number	RECALL (SVG) Minimum	RECALL (SVG) Maximum	RECALL (SVG) Mean	PRECISION (SVH) Minimum	PRECISION (SVH) Maximum	PRECISION (SVH) Mean
031	.034	.759	.2681	.050	.349	.393
032	.007	.750	.3021	.055	1.0	.880
033	0.0	.406	.1352	0.0	1.0	.673
034	0.0	.327	.1268	.186	1.0	.328
035	.019	.392	.1830	.688	1.0	.784
036	.045	.396	.1870	.583	.786	.740
037	.031	.458	.2383	.298	.833	.640
038	.046	.343	.1171	.441	.925	.720
039	0.0	.422	.1301	0.0	.583	.386
040	.025	.427	.1460	.158	1.0	.785

Table 12-3

RANGE, MEAN, AND STANDARD DEVIATION OF THE OVERALL PRECISION (QVH) FOR ALL QUESTIONS (N questions = 40)

The overall precision for a question is the fraction of items judged relevant and partially relevant by the user in relation to all retrieved items sent to the user for that question. (Overall recall for a question cannot be calculated because there was no knowledge of which relevant items were not retrieved by any search.)

Precision Range	Number of Questions	Question Numbers
.100 - .199	5	Q006; Q008; Q010; Q012; Q024
.200 - .299	3	Q011; Q013; Q021
.300 - .399	6	Q002; Q016; Q025; Q031; Q034; Q039
.400 - .499	7	Q001; Q005; Q009; Q017; Q020; Q023; Q028
.500 - .599	2	Q003; Q019
.600 - .699	6	Q014; Q018; Q027; Q029; Q033; Q037
.700 - .799	7	Q004; Q007; Q015; Q035; Q036; Q038; Q040
.800 - .899	2	Q030; Q032
.900 - 1.0	2	Q022; Q026

MEAN : 0.510
STANDARD DEVIATION : 0.2439

Figure 12-1

PLOT OF PRECISION AND RECALL (N SEARCHES = 360)

Each of the 360 searches is represented by a point in the scatter plot. The precision is plotted on the horizontal axis and the recall (using the union of relevant retrieved items as a base for comparison) is plotted on the vertical axis. A 1 represents a single point, a 2 represents 2 points falling in the same place, and so on. Beyond 9, the letters a, b ... are used. The precision and recall show a positive correlation of 15.86%. The best regression line, whichever is regarded as the independent variable, has a positive slope.

```
------------------------------------------------------------------

          .+....+....+....+....+....+....+X...+....+.
     1.0  +                                         +
          .                                         .
          .                                         .
          .              1                          .
          .      1         1                       1.
     .80  +                             1         1 +
          .              1               1  1      1.
          .    11                                  1.
 S        .          1 1          1      1   1  1   .
 V        .                    1   1        1  1    .
 G   .60  +      1    111            1     1   1    +
          .            1     1 1    221  1   1 1    .
          .              1      22       1 1   1    .
          .    1   1   1 1   1           1   1      .
          .             1                  1   2   3.
     .40  +      1   1  22           1    2 1 1   21+
          .     1                 111111    11211  2.
          .       1   1 1      1  11 11 112 2 1 11  .
          .      1  1  1       1  1   1  1 2      11Y
          .           1113 4     13   211 1 11 1   1.
     .20  +   11   1  1 1  12    11  112  1  21  2 1+
          Y       1    1   1 1     1    1211 1 111 2.
          .    1  1 112    112 21 11 2  121121 1 1 8.
          . 1 1  31111  1 1122 2  1 1 111  22  2   8.
          .  1 31121 31 2  31  3 2 3   1 1 3 1     K.
     0.0  +Y111      1  1      4                   C+
          .+....+....+....+....X....+....+....+....+.
              .1250     .3750     .6250     .8750
         0.000     .2500     .5000     .7500    1.000
 N=  360
 COR= .1586                SVH

     MEAN    ST.DEV.    REGRESSION LINE    RES.MS.
 X   .57217   .33541  X= .24938*Y+ .51749   .10997
 Y   .21926   .21330  Y= .10086*X+ .16155   .04448

 VARIABLE   9 SVH      VERSUS VARIABLE   8 SVG
```

SVG = Search Recall
SVH = Search Precision

Table 12-4

UTILITY MEASURES: DISTRIBUTION OF USER ASSIGNMENTS TO EACH MEASURE
(N users = 40)

WORTH SCALE
Was your participation in this project and the information which resulted:

		Number of Users
5	Worth much more than the time it took	16
4	Worth somewhat more than the time it took	12
3	Worth about as much as the time it took	8
2	Worth less than the time it took	4
1	Practically worthless	0

PROBLEM RESOLUTION SCALE
What contribution has this information made toward the resolution of your research problem:

		Number of Users
5	Substantial contribution	3
4		16
3		8
2		11
1	Nothing contributed	2

SATISFACTION SCALE
How satisfied were you with the results of the search:

		Number of Users
5	Satisfied	12
4		11
3		9
2		6
1	Dissatisfied	2

USER'S TIME
How much time did you spend reviewing these items?

	Number of Users
Less than 1 hour	10
1 - 2 hours	12
Over 2 hours	18

DOLLAR VALUE ASSIGNED
What is the dollar value of these items?

	Number of Users
I cannot assign a a dollar value	18
Less than $50	11
$50 - $100	3
$100 - $200	5
Over $200	3

Table 12-5

RANGE, MEAN, AND STANDARD DEVIATION OF UTILITY MEASURES ASSIGNED BY USERS (N users = 40)

Measure	Minimum	Maximum	Mean	Standard Deviation
UVA	0.17	12	2.4917	2.021
UVB	0	1000	75.25	172.475
UVC	2	5	4.0	1.0
UVD	1	5	3.150	1.063
UVE	1	5	3.625	1.78

UVA = Time spent by the user evaluating the items
UVB = Dollar value assigned
UVC = Worth assigned
UVD = Problem resolution
UVE = Satisfaction

Table 12-6

VALUES ASSIGNED FOR TIME SPENT BY THE USERS EVALUATING THE ITEMS RETRIEVED (UVA) (N users = 40)

"How much time did you spend reviewing these abstract?"

Time Spent	Number of Questions	Question Number
Less than 1 hour	7	Q002; Q008; Q014; Q026; Q028; Q029; Q031
1 to 2 hours	12	Q005; Q011; Q017; Q019; Q020; Q021; Q022; Q023; Q024; Q032; Q035; Q036
2 to 4 hours	13	Q003; Q006; Q007; Q009; Q012; Q013; Q018; Q025; Q030; Q033; Q034; Q037; Q039
4 to 6 hours	7	Q001; Q004; Q010; Q015; Q016; Q038; Q040
Over 6 hours	1	Q027

Table 12-7

VALUES ASSIGNED AS A DOLLAR VALUE OF A SEARCH BY THE USERS (UVB)
(N users = 40)

"What is the dollar value of these abstracts to you?"

Value Assigned	Number of Questions	Question Number
I cannot assign a dollar value	18	Q002; Q004; Q006; Q007; Q008; Q009; Q011; Q012; Q014; Q018; Q019; Q020; Q023; Q025; Q026; Q027; Q030; Q038
$1 - $50	12	Q003; Q010; Q013; Q014; Q017; Q021; Q022; Q024; Q028; Q031; Q035; Q036
$51 - $100	3	Q005; Q016; Q039
$101 - $200	4	Q001; Q029; Q032; Q034
$201 - $300	1	Q037
$301 - $400	1	Q040
$1000	1	Q033

Table 12-8

VALUES ASSIGNED BY THE USERS TO THE WORTH OF A SEARCH (UVC)
(N users = 40)

"Was your participation in this project and the information which resulted: ..."

Value	Meaning	Number of Questions	Question Number
5	Worth more than the time it took	16	Q001; Q004; Q007; Q015; Q019; Q020; Q021; Q023; Q026; Q029; Q030; Q032; Q033; Q035; Q037; Q038
4	Worth somewhat more than the time it took	12	Q002; Q005; Q009; Q010; Q011; Q016; Q018; Q031; Q034; Q036; Q039; Q040
3	Worth about as much as the time it took	8	Q003; Q008; Q012; Q014; Q022; Q025; Q027; Q028
2	Worth less than the time it took	4	Q006; Q013; Q017; Q024
1	Practically worthless	0	

Table 12-9

VALUES ASSIGNED BY THE USERS TO THE CONTRIBUTION TO THE RESOLUTION OF THEIR PROBLEM BY THE INFORMATION RECEIVED (N users = 40)

"What contribution has this information made to the resolution of your problem?" Range: from 1 (nothing contributed) to 5 (substantial contribution)

Value	Number of Questions	Question Numbers
5	3	Q030; Q032; Q038
4	15	Q001; Q007; Q011; Q015; Q016; Q021; Q023; Q026; Q027; Q029; Q033; Q035; Q037; Q039; Q040
3	9	Q002; Q003; Q004; Q005; Q018; Q019; Q020; Q034; Q035
2	11	Q006; Q008; Q009; Q010; Q012; Q013; Q017; Q022; Q025; Q028; Q031
1	2	Q014; Q024

Table 12-10

VALUES ASSIGNED BY THE USERS TO THEIR OVERALL SATISFACTION WITH THE RESULTS OF THE SEARCH (N users = 40)

"How satisfied were you with the results of the search?" Range from 1 (dissatisfied) to 5 (satisfied)

Value	Number of Questions	Question Numbers
5	11	Q001; Q007; Q011; Q016; Q020; Q023; Q026; Q030; Q032; Q037; Q038
4	13	Q003; Q004; Q015; Q019; Q021; Q024; Q029; Q033; Q034; Q035; Q036; Q039; Q040
3	8	Q002; Q006; Q008; Q009; Q010; Q018; Q027; Q028
2	6	Q005; Q013; Q014; Q017; Q022; Q025
1	2	Q012; Q031

Table 12-11

MEAN AND STANDARD DEVIATION FOR THE DEGREE OF OVERLAP IN SEARCH TERMS AND ITEMS RETRIEVED FOR SEARCHES FOR THE SAME QUESTION (N questions = 40; N searches per question = 5; N comparisons per search = 4 (it was not compared with itself); N pairs of comparisons = 800 (40 X 5 X 4))

Overlap	Mean	Standard Deviation
Selection of search terms	.27	.20
All items retrieved	.16	.28
Relevant or partially relevant items retrieved	.18	.30

CHAPTER 13. METHODS OF STATISTICAL ANALYSIS

13.1 Introduction

The key to understanding the statistical aspects of this study of on-line searching is to realize that there are five distinct entities involved every time an evaluation is made. These entities are:

The user
The question
The searcher
The search
The retrieved item

Any measured variable describes one or more of these entities. For example information about the intended specificity or complexity of the question describes only the question. The cognitive attributes of the searcher describe only the searcher. The number of commands or the number of search terms used describe only the search. The data base identifier and accession number of a retreived item describe only the retrieved item. On the other hand, the evaluation is a description of the relevance of the retrieved item, given by the user, and so relates two entities. The overall retrieval or precision scores for a given question combines several searches by several searchers and so are descriptive of the question, the searches and the searchers together.

The data may be examined at each of several different levels of aggregation. Some of these levels of aggregation are more familiar to the practitioner community, while others are more powerful in the search for possible explanatory relations. Corresponding to each level of aggregation a specific data file may be formed. It is formed by retaining those of the 90 variables that are meaningful at that level of aggregation, and either removing or ignoring the others. With reference to the codebook of 90 variables (Table 7-1), we will briefly describe the status of each of the variables. In giving this description it is helpful to think of a kind of "backbone" containing five variables: the question number, the database number, the item number, the searcher number, and the evaluation. This represents the finest possible level of detail in that it is free from the confounding influences that arise in any real search. The search entity is defined by giving both the question number and the searcher. The question entity is identified by giving only the question. The range of applicability of variables is as follows; (as shown earlier in Table 7-1):

TABLE 7-1

Variable no	Applicability
1	Item
2-15	Search
16-36	Question
37-51	Searcher
52-55	Question and User
56-59	Question and Searcher
60-81	Question
82-90	Searcher

The files used to investigate various relationships vary from files containing one case for each question up to the most complicated file containing one case for each retrieved item. Their properties are summarized in Table 13-1.

Table 13-1

OVERVIEW OF DATA FILES

For each entity or relation the correct data file must be analyzed. The file to be used is the smallest one applicable to all of the entities under investigation. For example, the file with 8956 duplicated items contains 4115 items occurences of retrieval by project searchers. It cannnot be used to study the effect of searcher characteristics because of the unequal weight that these three individuals would receive.

Case	N of cases	Use of file
Question	40	Characteristics of questions User evaluation of unions
Searchers	40	Cognitive and experience data for 36 outside;3 project searchers; 1 judge
Search-project	160	Characteristics/comparisons The 4 project searches
Search-outside	200	The 5 outside searches
Overlap	800	Overlap in search terms or Retrieved items for every Question and searcher pair.
Unique item	5411	Characteristics of retrieved items. Item-wise analysis of the impact of question characteristics on relevance
Distinct item	3689	Outside searches only
Duplicated item	4841	Item-wise analysis of the impact of outside searcher characteristics on relevance.
Duplicated item	4115	Item-wise analysis of the impact of project searcher characteristics on relevance.
Duplicated item	8956	Item-wise analysis of the impact of search characteristics on relevance.

The use of each file is best illustrated by one or two examples. Suppose, for example, we want to know what effect the amount of available public knowledge has on the precision and recall of searches for a given question. We can address this directly by examining the file with 40 cases, one for each question. We can ask whether the union of nine search results had high or low precision for each question, and correlate that with the public knowledge variables. On the other hand, "recall" in this experiment has been defined as the fraction of all relevant retrieved items retrieved in a given search. Therefore, to examine the relation between recall and a search characteristic we must go to the files with 160 cases (for the four project searches) and with 200 cases (for the outside searches).

If we want to know the relative effectiveness of the four types of project searches we will address the question to the file with 160 cases. If we want to know the impact of the cognitive characteristics of the searcher on precision and recall we will address the question to the file with 200 cases.

If we want to relate characteristics of the retrieved items to characteristics of the question, without regard to the search or searcher who retrieved the items we address our questions to the file with 5,411 cases.

Finally, if we want to keep track of the retrieved items and the detailed characteristics of the search that retrieved them we may address the question to the file with 8,956 cases.

The difference, 8,956 minus 5,411 or 3,545 represents the number of times an item was retrieved more than once. In order to study the effects of multiple retrieval on the expected relevance of an item we have added one variable to the file with 5,411 cases. This is the number of times that each item is retrieved by outside searchers, and can take the values 1-5.

13.2 Significance and Importance

It is important to distinguish between findings that are statistically significant and those findings that provide a substantial explanation of the relevance of retrieved items.

When a statistically significant relationship is found it can be assigned some measure of association. This is a measure of the extent to which one of the variables in question (the one presumed independent) determines the other (the one taken to be dependent). The fact that a relationship is significant does not mean that it is important.

We regard a relationship as important if the independent variable explains a substantial amount of the observed variation in the dependent variable. The measures of importance that have been used in this study are the R-squared measure for regression analysis, and the t value for analysis of the log cross ratio. We pause for a moment to review the meanings of these methods.

13.3 Regression analysis

In a regression analysis, exploring the dependence of Y on X, the analyst (in this case, aided by the BMDP package) tries to find the best straight line describing Y as a function of X. We may imagine all the values of Y and X plotted in a single graph. The calculations themselves have been perfromed using the BMDP package for this and all of the other statistical analyses described in Chapters 13-16. [13-1]

When such a graph is made the values of Y will show some substantial variation. This degree of variation is conveniently summarized by a statistical quantity called the variance. The variance is the average value of the square of the difference between any particular value of Y and the average of all the values of Y. When a line is fit to the data, to explain Y, a certain amount of the value of Y remains unexplained. The average square of the unexplained part is called the residual mean square variation. The difference between the two is the part of the variance that is explained by the model. This may be expressed as a percentage of the original variance, which is called R-squared. Thus, if R-squared is 80%, the model explains 80% of the original observed variation in the values of Y. If R-squared is 10%, 90% of the original variation means unexplained. As a rough rule of thumb, models that explain less than 50% of the variance will not be regarded as important even if they are statistically significant.

13.4 Logarithmic Cross Ratio Analysis

In analysis of the large files, containing one entry for each retrieved item, we have used a powerful technique called cross ratio analysis. To apply the cross ratio analysis, each variable (for which such a distinction is meaningful) is broken into a class of high values and a class of low values. For convenience the mean is generally taken as the dividing line. Since the dependent variable of greatest interest is the relevance of retrieved item we take for high value of the relevance, "relevant" or "partially relevant". Every case may then be classified into exactly one of four cells in a 2 x 2 table. The number of cases for which the variable is low and the item is not relevant is designated by "a" and so forth. The cross ratio for this table is defined as the ratio of two products. CR=AB/CD.

EXAMPLE ANALYSIS OF CROSS RATIO

	Independent Variable	
	Low	High
Not Rel	A	C
Rel or Part Rel	D	B

When it is written in this form its meaning is rather obscure. But, it is easy to see that if A and B are large while C and D are small the cross ratio will be large. The meaning becomes clearer if we consider the odds that a high value of the independent variable leads to relevant documents. For high values of the independent variable the odds that a retrieved item will be relevant or partially relevant are given by B/C. For low values these odds are given by D/A. The ratio of these two odds ratios reflects the increase in odds due to moving from a low value of the variable to a high value of the variable. This ratio (B/C)/(D/A) is precisely equal to the cross ratio. For this reason the cross ratio is also referred to as the odds ratio.

Since the cross ratio is always positive and may become infinite, it is replaced by its logarithm which has a more symmetrical distribution and which, for samples as large as the ones we are using is essentially normally distributed. Thus, in our discussion of the impact of independent variables in the very large files we will consistently use the log odds ratio as a statistical indicator. Since the log odds ratio is distributed essentially normally, the t statistic (that is the measured value of the log odds ratio divided by its standard deviation) is a measure of the statistical significance of the observed effect. At the same time, the value of the odds ratio itself gives us a simple way of describing the importance of a particular variable.

Example calculation. Each variable has been replaced by an indicator variable (see Table 16-1 of cut points). The cut point for SVA is the mean 7.36. There are 2166 cases with SVA below this value. Note that SVA, the number of relevant items retrieved, is a property of the search as a whole, and is inherited by each of the items retrieved in that search. Thus we expect that the items retrieved in searches with high values of SVA have a better chance to be relevant, although each particular item may be either relevant or not relevant. In fact, in searches with SVA below the cutoff, 1361 items are not relevant, while only 776 are relevant.

The contingency table looks like this:

SVA	BELOW M	ABOVE M	
NREL	1361	776	2137
REL PREL	805	1899	2704
	2166	2675	4841

Odds Above mean 1899/776
Below mean 805/1361

Ratio $\frac{1899}{776} \times \frac{1361}{805} = 4.137$

LN (4.137) = 1.42

STD ERROR (from BMDP) = 0.062
t value = 24.395

Note: 0.062 is the std error assuming a value of ln (cross ratio) $\neq 0$. The t value is calculated on the assumption that it is 0.

This is an example of a statistically significant (t larger than 2) result with no meaning. It says that items retrieved in cases with a high number of relevant retrieval items are much more (factor 4.137) likely to be relevant.

The log odds ratio has been used because it is resistant to two types of sample selection bias, which may be present in this study. One type of selection bias is in the distribution of relevance. Although the average relevance found in this project (about 50%) is similar to that found in other studies, the end users were self-selected, and this may introduce some unknown bias in judgements of relevance. Similarly, the searchers were self selected and, particularly with regard to cognitive characteristics, may not be typical of searchers in general. The virtue of the log odds ratio, or of the cross ratio, is that as long as the selection biases of two variable are independent of each other, the log odds ratio is unaffected by the bias. This feature makes the log odds ratio important in so called retrospective clinical studies, where it is not possible to form a random sample. It is appropriate, for the same reasons, in this study. A detailed discussion of the meaning of the log odds ratio is given by Fleiss [13-2].

Table 13-2

CUTPOINTS FOR THE STUDY OF CROSS-RATIO ANALYSIS

Each variable was analyzed to define a high and a low value, by calculating the mean, using a sutiable data file. For exampple, the mean of search variables was calculated using the file with 360 searches in it. The same file was used to calculate the mean of Question variables, since the mean is not changed by having 9 identical copies of each question variable in the file.

VARIABLE NO.	NAME	TOTAL FREQUENCY	CUTPOINT
1	SVA	360	7.636
2	SVB	360	7.050
3	SVC	360	10.192
4	SVD	360	24.878
5	SVE	360	24.311
6	SVF	360	49.189
7	SVG	360	0.219
8	SVH	360	0.572
9	SVI	360	14.511
10	SVJ	360	3.397
11	SVK	360	10.331
12	SVL	360	0.238
13	SVM	360	0.218
14	SVN	360	0.455
15	QVA	360	33.575
16	QVB	360	36.200
17	QVC	360	65.500
18	QVD	360	135.275
19	QVE	360	159.825
20	QVF	360	295.100
21	UVA	360	2.492
22	UVB	360	75.250
23	UVC	360	4.000
24	UVD	360	3.150
25	UVE	360	3.625

User characteristics were calculated on a file containing the 40 questions. For the PREBRD variable there were two missing cases. Datra are missing for some of the other variables as well. For some, such as SUGGGESTED DATABASES, a cut point has no meaning, and is not reported here. The APPLN is a categorical variable, so the notion of "above or below the cut point has no validity."

VARIABLE NO.	NAME	TOTAL FREQUENCY	CUTPOINT
1	PREBRD	38	3.750
2	APPLN	40	7.050
3	LANG	40	11.375
4	YEARGEN	40	14.175

Frequency of DIALOG use was cut between "2" and "3", as indicated.

VARIABLE NO.	NAME	TOTAL FREQUENCY	CUTPOINT
1	FREQDIAL	52	2.923

Context variables defined by the user were cut as follows: For example, a high value of PROBDEF1 is a value above 3.670 on the five point scale.

VARIABLE NO.	NAME	TOTAL FREQUENCY	CUTPOINT
1	PROBDEF1	40	3.670
2	INTENT1	40	2.925
3	PROBKNO1	40	3.625
4	INTKNO1	40	3.475

The values assigned by the project searchers, or by all searchers, had different cutpoints, corresponding to the observed distribution of those values

VARIABLE NO.	NAME	TOTAL FREQUENCY	CUTPOINT
1	PROBDEF2	160	1.444
2	INTENT2	160	1.256
3	PROBKNO2	360	2.959
4	INTKNO2	360	1.861

The question calssification variables were treated separately, since one of the research goals is to test for relations between them. For use in the cross ratio analysis, the cutpoints are as follows. A value of CLTYSYN above mean is greater than 4.575. For the second judge, the cutpoint is 4.700

VARIABLE		TOTAL FREQUENCY	CUTPOINT
NO.	NAME		
1	CATEGORY	40	1.825
2	CLTYSEM	39	4.718
3	CLTYSYN	40	4.575
4	CLTYAVG	40	4.587
5	SPECQURY	40	3.756
6	SPECSUBJ	40	4.691
7	SPECMEAN	40	4.387
8	SERCONCP	40	4.400
9	CONSTRAN	40	1.125
10	TRANSSER	9	0.050
11	FINAL	40	0.000
12	CATEG2	40	1.550
13	CLTYSEM2	40	4.500
14	CLTYSYN2	40	4.700
15	CLTYAVG2	40	4.700
16	SPECQRY2	40	3.015
17	SPECSUB2	40	4.628
18	SPECMEN2	40	3.830
19	SERCONC2	40	2.825
20	CONSTR2	40	0.475
21	TRANSER2	40	0.050
22	FINAL2	40	0.000

The searcher cognitive characteristic cutpoints were calculated from a file in which the project searchers appeared 4 times each, and the auxiliary judge was included. The means are essentailly ahe same as the means for the 36 outside searchers alone. The LSI is a categorical variable, so the notion of "above or below the cut point has no validity."

VARIABLE		TOTAL FREQUENCY	CUTPOINT
NO.	NAME		
1	RAT	52	11.635
2	EAS	52	11.077
3	CE	52	23.769
4	RO	52	26.308
5	AC	52	36.577
6	AE	52	33.212
7	ACCE	52	12.615
8	AERO	52	6.865
9	LSI	52	2.058

13.5 Logistic Regression

The key variables of precision and recall are both bounded by 0 and 1 (that is they are percentages.) In this situation it is sometimes useful to perform the so called logistic transformation. Each variable is replaced by the logarithm of the corresponding odds ratio. For example, the value 40% is transformed to logarithm of 40/60. We have performed multiple regression analysis of the transformed values of precision and recall against 4 cognitive variables, the users estimate that information will be available, the searcher's frequency of using Dialog, and the number of terms, commands, and cycles used in the search.

CHAPTER 14. CONSISTENCY OF JUDGES

14.1 Consistency of Context Variables

All of the variables describing the question and its context were appraised by at least two judges. The consistency of those judgements is a measure of the validity of the corresponding concept. When the concept appears valid, one may examine the impact of the corresponding attribute on the relevance of retrieved items. If the judges agree, and the impact, as calculated using either judges score, is significant, we may conclude that the characteristic has some predictive value.

For variables characterizing the state of public or personal knowledge there is no reason to expect agreement, but the distribution of differences is of interest.

The results are summarized in full detail in Table 14-1. The judges indicated their judgments on a five point scale. The table shows the differences between the scores assigned by the first judge (the user) and the scores assigned by the project searcher, who served as the second judge."0" indicates perfect agreement. For example, for the variable PROBDEF there was exact agreement in 15 cases and disagreement by two units in 6 cases (4 plus 2). Note that if each judge assigned scores at random the distribution would still be peaked at zero, but it would be approximately triangular. Ignoring missing values, a row for 25 cases would read:

Diff:	-4	-3	-2	-1	0	1	2	3	4	
	1	2	3	4	5	4	3	2	1	(5 exact agreements)

Table 14-1.

QUESTION CONTEXT CONSISTENCY (N questions=40)

The distribution of differences between judge 1(user) and judge 2 (project searcher) on concepts describing the context: For PROBDEF and INTENT the first judge is the user. For the other variables two project team members were the judges. A difference of 0 represents exact agreement.

	Judge 1 - Judge 2 Difference										
Variable	-5	-4	-3	-2	-1	0	1	2	3	4	5
PROBDEF				2	7	15	8	4	3	1	
INTENT		1	2	3	6	12	8	5	3		
PROBKNO		1	2	3	5	6	5	8	4	3	3
INTKNO					2	5	6	11	15	1	

PROBDEF1 = Problem Definition by User;
INTENT1 = Intent by User;
PROBDEF2 = Problem Definition by Searcher;
INTENT2 = Intent by Searcher;
PROBKNO1 = Problem-Public Knowledge by User;
PROBKNO2 = Problem-Public Knowledge by Searcher;
INTKNO2 = Internal Knowledge of Searcher;
INTKNO1 = Internal Knowledge of User

Discussion of Consistency of Judgments - Context

We studied the consistency between user and searcher estimates of four characteristics: problem definition, intent of the user, estimate of the availability of public knowledge and estimate of the internal knowledge. The first three of these variables refer to the same concept while the forth was specific to either the user or the searcher. The results are presented as histograms of the difference variables. The key findings are these. For problem definition, on a scale of 1-5, the difference shows a clear peak at 0 with 15 of the 40 cases having exact agreement. 14 of the remaining cases differ by only 1 unit. Thus, we can say that in nearly 3 out of 4 cases the project searcher and the user agreed within 1 unit on whether the problem was weakly or clearly defined.

With regard to whether the intent is narrowly or broadly defined the situation is not quite so good. In 11 cases there was exact agreement and in a total of 25 there was agreement within 1 unit.

The situation deteriorates further when we consider estimates of the probability that information about the problem will found in the literature. There was exact agreement in only 6 cases and agreement to within 1 unit in only 16 cases. The most common occurence (8 cases) is a difference of 2 units. The user's estimate that information on the problem will be found in the literature is 2 units higher than the searcher's estimate.

With regard to internal knowledge we would expect that the user estimates higher personal knowledge of the subject than does the searcher. This is borne out by the data. In 26 of the cases the user's estimate of his or her personal knowledge was 2 or more units higher than the searcher's estimate.

Table 14-2

CONSISTENCY OF QUESTION CLASSIFICATION: (N questions = 40)

The difference between the evaluations given by two different judges is an indication of the validity and consistency of the question classification concepts tested in this project. The results for SPECQUERY and SEARCONC show substantial disagreement. The "7" represents one outlying value.

	Judge 1 - Judge 2										
Variable	-5	-4	-3	-2	-1	0	1	2	3	4	5	
CATEGORY		1	1	1	5	16	9	5	2			
CLTYSEM		1		2	5	23	3	4	2			
CLTYSYN	1	1		2	2	29	3	1			1	
SPECQURY	3			2	4	4	9	6	7	5		
SPECSUBJ				1	9	19	7	4				
SEARCONC				3	2	5	11	8	5	4	1	"7"
CONSTRAN					1	20	13	5		1		

CATEGORY = Question Classification (Judge 1): Domain: Dialindex Categories
CLTYSEM = Question Classification (Judge 1): Clarity: Semantics;
CLTYSYN = Question Classification (Judge 1): Clarity: Syntax;
CLTYAVG = Question Classification (Judge 1): Clarity Score;
SPECQURY = Question Classification (Judge 1): Specificity: Query;
SPECSUBJ = Question Classification (Judge 1): Specificity: Subject;
SPECMEAN = Question Classification (Judge 1): Specificity Score;
SERCONC = Question Classification (Judge 1): Number of Search Concepts;
CONSTRAN = Question Classification (Judge 1): Number of Constraints;

14.2 Consistency of Judgments: Question Classification

We can make a somewhat more detailed discussion of the data in Table 14-2. This table contains the difference between the scores assigned by two project judges. It is read in the same way as Table 14-1. On the estimate of the number of dialindex categories the judges agreed exactly 16 times and were within 1 unit 30 times out of the 40. On clarity of semantics they agreed exactly 23 times and were within 1 unit 31 times. On clarity of the syntax they agreed exactly 29 times and were within 1 unit 34 times. This resulted in an agreement on the average clarity score which was perfect in 20 cases and within 1 in 38 cases.

With regard to specificity of the query the situation is not good at all. Disagreement ranges from -4.75 to +3.7. There is agreement to within 1 unit in only 17 of the 40 cases. With regard to specificity of the subject on the other hand, the situation is quite good. There is exact agreement in 19 cases and agreement to within 1 unit in 35 cases.

The mean specificity score is widely scattered due to the lack of inter-judge agreement on specificity of the query.

The two judges agreed in only 5 cases on the number of search concepts involved in the question and one of the judges estimated that the number of concepts was larger in 30 of the 40 cases.

Perhaps surprisingly, there was substantial agreement (20 cases out of 40) on the number of constraints. One of the judges estimated the number of constraints to be higher than did the other in 19 of the remaining 20 cases.

A comparison on the number of presuppositions was possible in only 9 cases and does not support any further analysis.

The question of the significance of inter-judge consistency, in relation to the fundamental problem of improving retrieval performance is discussed in Section 16.4.2

Table 14-3.

QUESTION CLASSIFICATION: CONSISTENCY (N questions = 40;176)

The mean and standard deviation of the differences between judges are summarized for the 40 project questions and for 176 questions from an earlier study. The fraction of the cases in which the difference between the two judges scores is shown as %Agree.

	N=40			N=176		
	Mean	StdDev	%Agree	Mean	StdDev	%Agree
CATEGORY	0.275	1.414	40.0	0.062	0.822	64.2
CLTYSEM	0.100	1.297	57.5	-0.114	0.813	81.3
CLTYSYN	-0.125	1.453	72.5	0.335	2.033	58.5
SPECQURY	0.742	2.225	10.0	0.080	2.010	39.2
SPECSUBJ	0.063	0.644	47.5	0.070	0.840	66.5
SEARCONC	1.575	1.973	12.5	1.426	1.917	27.0
CONSTRAN	0.650	0.921	50.0	0.625	0.960	52.8

CATEGORY = Question Classification (Judge 1): Domain: Dialindex Categories;
CLTYSEM = Question Classification (Judge 1): Clarity: Semantics;
CLTYSYN = Question Classification (Judge 1): Clarity: Syntax;
SPECQURY = Question Classification (Judge 1): Specificity: Query;
SPECSUBJ = Question Classification (Judge 1): Specificity: Subject;
SERCONC = Question Classification (Judge 1): Number of Search Concepts;
CONSTRAN = Question Classification (Judge 1): Number of Constraints;

14.3 Additional Data on Question Classification

We have given the detailed analysis of inter-judge consistency for the 40 questions in this project. In addition, data were available for 176 questions from an earlier project, which help to increase our confidence in the validity of these question classification concepts. The data are summarized in Table 14-3, where we give the mean and standard deviation of the difference, and also the percentage of cases in which there is exact agreement. As explained earlier, the "null hypothesis" would give exact agreement in 20% of the cases.

Two of the variables show agreement in more than 55% of the cases, for both projects: CLTYSEM and CLTYSYN, which we regard as clearly significant.

CHAPTER 15. OVERLAP OF SEARCHES AND RESULTS

Each question was searched by 5 outside searchers. It is interesting to calculate the degree to which they "agreed" in their treatment of the questions. As described in sections 5.3.3 and 5.3.4, an asymmetrical measure of overlap may be defined between any two searchers of the same question. This yields 40 (questions) x 5 (outside searchers) x 4 (other searches to which it may be compared) = 800 pair comparisons. The specific variables are STOVLP(I,J) - the overlap in search terms for searches I and J of a given question; RPROVLP(I,J) - the corresponding overlap in relevant or partially relevant retrieved items, and RETOVLP(I,J) - the corresponding overlap in all retrieved items. Note that although each search corresponds to an individual searcher, the numbers I and J are assigned arbitrarily, and simply run from 1 to 5 for each question. They do not play a role in the analysis, and are used only in the explanation of how the overlap is calculated.

Section 15.1 Overlap Studies

The relations between searches are characterized by the overlap in search terms used and in retrieved items among various searches of the same question. We use the asymmetrical measure of overlap given by the intersection of two sets divided by the first named of the two. Thus, for the five outside searches of any question there are 20 values of the overlap in search terms used and another 20 values of overlap in items retrieved. For example, if search #2 used six search terms, search #4 used seven search terms, and they had three in common then the search term overlap measures are: STOVLP(2;4)=3/6, STOVLP(4;2)=3/7.

There are 20 values of the search term overlap because each of the five searches may be compared with the other four.

Similarly if the retrieved items for search #2 number 144, the retrieved items for search #4 number 72 and they have 36 in common the two overlap measures are RETOVLP(2;4)=1/4 and RETOVLP(4;2)=1/2.

There are three kinds of statistical questions that we have addressed in this analysis:

1. What is the distribution of the value of the search term overlap for all of the 20 x 40 = 800 possible cases?

2. What is the distribution of the retrieved item overlap for all of the 20 x 40 = 800 cases?

3. Is there a significant correlation between the overlap in retrieved items and the agreement in search terms over these 800 cases?

Data are presented in histograms showing the number of pairs r which the degree of overlap falls into a specified range. If reement among the searchers were large most of these values ld be close to the maximum possible value of 1, and the data ld lie close to the lower edge of the histogram.

Table 15-1.

AGREEMENT ON SEARCH TERMS (N OVERLAPS = 800)

The distribution of searcher agreement on the terms used to search a question is displayed in a histogram. If there were exact agreement, the overlap would be 1.0. The observed distribution. In 11.1% of the cases there was less than 5% agreement on search terms. In 44.3% of the cases agreement was 20% or less. The horizontal is marked in percentage of all cases having the designated range of overlap values. Overlap is between 50 and 55% in 8.6% of the cases.

```
AT LEAST       0.00000                             5                         10                         15                        20
BUT NOT OVER: FREQ     % +-------------------------+--------------------------+--------------------------+--------------------------+
    0.0500000   89  11.1 IXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
     0.100000   70   8.8 IXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
     0.150000   82  10.3 IXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
     0.200000  113  14.1 IXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
     0.250000   97  12.1 IXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
     0.300000   52   6.5 IXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
     0.350000   72   9.0 IXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
     0.400000   33   4.1 IXXXXXXXXXXXXXXXXXXXXXX
     0.450000   47   5.9 IXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
     0.500000    6   0.8 IXXXX
     0.550000   69   8.6 IXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
     0.600000   24   3.0 IXXXXXXXXXXXXXXXX
     0.650000    8   1.0 IXXXXX
     0.700000   10   1.3 IXXXXXX
     0.750000   13   1.6 IXXXXXXXX
     0.800000    3   0.4 IXX
     0.850000    0  00.0 I
     0.900000    0  00.0 I
     0.950000    0  00.0 I
      1.00000   12   1.5 IXXXXXXXX
                         +-------------------------+--------------------------+--------------------------+--------------------------+
        TOTAL  800 100.0                           5                         10                         15                        20
```

Footnote: X = approx 1.5 case

Table 15-2.

AGREEMENT ON RETRIEVED ITEMS (N OVERLAPS = 800)

The distribution of searcher agreement as measured by retrieved (evaluated) items is displayed in a histogram. If there were exact agreement, the overlap would be 1. For 66.4% of the possible combination the overlap is not more than 10%. The average overlap is 16.6% and the distribution is strongly skewed.

```
--------------------------------------------------------------------

AT LEAST       0.00000                 10               20                30                40               50                60
BUT NOT OVER:  FREQ    %   +----------------+----------------+-----------------+-----------------+----------------+-----------------+
    0.0500000   469  58.6  IXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
     0.100000    62   7.8  IXXXXXXXXXXXXX
     0.150000    35   4.4  IXXXXXXX
     0.200000    36   4.5  IXXXXXXXX
     0.250000    27   3.4  IXXXXXX
     0.300000    10   1.3  IXX
     0.350000    19   2.4  IXXXX
     0.400000    11   1.4  IXX
     0.450000     9   1.1  IXX
     0.500000     7   0.9  IX
     0.550000    19   2.4  IXXXX
     0.600000    11   1.4  IXX
     0.650000     6   0.8  IX
     0.700000    15   1.9  IXXX
     0.750000     4   0.5  IX
     0.800000     5   0.6  IX
     0.850000     8   1.0  IXX
     0.900000     3   0.4  IX
     0.950000     3   0.4  IX
      1.00000    41   5.1  IXXXXXXXXX
                           +----------------+----------------+-----------------+-----------------+----------------+-----------------+
        TOTAL   800 100.0                  10               20                30                40               50                60
```

X = approximately 12 cases.

Table 15-3.

OVERLAP OF RELEVANT/PARTIALLY RELEVANT ITEMS (N OVERLAPS = 800)

The distribution of searcher agreement as measured by relevant or partially relevant retrieved items is displayed in a histogram. In 63.9% of the cases the agreement is not more than 10%. The mean value of the overlap is 18% and the distribution is strongly skewed.

```
AT LEAST      0.00000                    10               20               30               40               50               60
BUT NOT OVER: FREQ   %   +----------------+----------------+----------------+----------------+----------------+----------------+
    0.0500000  471 58.9  IXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
     0.100000   40  5.0  IXXXXXXXX
     0.150000   49  6.1  IXXXXXXXXXX
     0.200000   23  2.9  IXXXXX
     0.250000   21  2.6  IXXXX
     0.300000   13  1.6  IXXX
     0.350000   25  3.1  IXXXXX
     0.400000   12  1.5  IXX
     0.450000   14  1.8  IXXX
     0.500000    3  0.4  IX
     0.550000   27  3.4  IXXXXXX
     0.600000    9  1.1  IXX
     0.650000    4  0.5  IX
     0.700000   13  1.6  IXXX
     0.750000    5  0.6  IX
     0.800000    5  0.6  IX
     0.850000    8  1.0  IXX
     0.900000    6  0.8  IX
     0.950000    2  0.3  I
      1.00000   50  6.3  IXXXXXXXXXX
                         +----------------+----------------+----------------+----------------+----------------+----------------+
        TOTAL  800 100.0                 10               20               30               40               50               60
```

X = approximately 5 cases

Section 15.2 When searchers agree

We gave particular attention (Table 15-4.1) to the 3.689 items that were retrieved by the outside searchers. Of these, 924 (25%) were relevant, 972 (26%) were partially relevant, and 1793 (49%) were not relevant. We then broke the items down into those which were retrieved by only a single searcher, those retrieved by 2 searchers and so on. The effect of multiple recovery is expressed in odds ratios in Table 15-4.1) In the group as a whole the odds for relevant as against not relevant are approximately 5 to 10 (924/1793). In items that were retrieved only once the corresponding odds are 4 to 10. In items that are retrieved twice they are 10 to 10. For items that have been retrieved 3 or more times the odds are 16 to 10 for relevance as opposed to not relevance. **The more often an item is retrieved, the more likely it is to be relevant.**

This is an important finding. It suggests that although searchers disagree substantially in the items that they retrieve, when they do agree they are likely to be producing relevant items. This suggests that one possible super-strategy for the conduct of on-line searches is to have several independent searchers work on the problem and to examine first the intersection of their retrieved sets. If a single searcher has worked on the problem the odds for relevance vs. not relevance are less than 1 to 2, if 3 or more agree on a retrieved item then the odds switch to be almost the reverse (that is, 3 to 2 in favor of relevance). It would be interesting to speculate on the economics of going to such a multiple search strategy in real world situations.

Table 15-4.1

RELEVANCE OF DUPLICATED ITEMS (N unique items; outside = 3689)

Another measure of overlap is based on the fact that the overlap in retrieved items is due to items that were retrieved more than once. This table is a cross-tabulation of the relevance of an item by the number of different outside searches in which it was retrieved. For example, of 1602 items retrieved in only one outside search 400 were judged relevant; of 128 retrieved in exactly 3 outside searches, 54 were judged relevant.

	Number of times retrieved						
EVAL	1	2	3	4	5	6	TOTAL
REL	620	185	91	24	4		924
PREL	750	129	59	30	3	1	972
NREL	1544	174	56	19	0		1793
NEVAL	0	0	0	0	0		0
	2914	488	206	73	7	1	3689

Table 15-4.2

ODDS OF RELEVANCE VERSUS NUMBER OF TIMES RETRIEVED

In this table, we focus attention on the relative odds that an item is relevant versus non-relevant. To sharpen the analysis (in this section of the study only) partially relevant items are disregarded. Thus the total of all retrieved relevant items (924) is divided by the total number of non-relevant unique items retrieved to give a base line measure ("any number of retrievals")

Retrieved by n Searchers	Rel	Not Rel	Odds
Any	924	1793	0.52
1	620	1544	0.40
2	185	174	1.06
3,4,5	119	75	1.59

Section 15.3 Does search term agreement explain overlap?

We have prepared a scatterplot of the agreement as measured by search terms and as measured by overlap. It shows no clear relation. A regression analysis shows that only 2.5% of the variation in overlap of retrieved items can be attributed to overlap in the search terms.

In the scatterplot each "1" represents a particular comparison of two searches of the same question. When points coincide numbers are used, and then letters "A"=10, "B"=11 and so forth. The bulk of the data is concentrated in the very lowest row of the plot, because overlap of retrieved item sets is so small.

The scales run from 0. to 1. on both axes. For example, "9" on the horizontal axis represents 0.9, and so on.

Table 15-5

SCATTER PLOT OF SEARCH TERM AND RETRIEVED ITEM OVERLAP

Each point represents the overlap in search terms and the overlap in retrieved items for a pair of searches of the same question. The search for a regression relation between the variables was unsuccessful. (R-squared of 2.5%)

OVERLAP OF RETRIEVED ITEM SETS

```
       0.00000                                                                                           1.00000
           0         1         2         3         4         5         6         7         8         9        10
          -+---------+---------+---------+---------+---------+---------+---------+---------+---------+---------+
  1.00000 +1    1      31   12 321  5   1   3  1    1  2 2   2         1      1   1   3    1                   1
 0.975000 +                                                  2
 0.950000 +     1                                                Å1
 0.925000 +                                                  1
 0.900000 +1                1
 0.875000 +                             1
 0.850000 +               1
 0.825000 +                       1                          1
 0.800000 +            1            4       2
 0.775000 +1           1                             1
 0.750000 +                         1                1
 0.725000 +
 0.700000 +1      1                 1          1                                           1
 0.675000 +                         1            1 1             1                    1                        1
 0.650000 +              2     1    2                 1      1                                                 1
 0.625000 +          1                      1          1
 0.600000 +                                                  1
 0.575000 +               1                      2       1       1            1
 0.550000 +      1          1       1       1
 0.525000 +          1      1               1          1           1
 0.500000 +1     2       1   1        2     1  1      1      1         1
 0.475000 +     1                   2       1
 0.450000 +      1    11         1      11     1   1         1
 0.425000 +     1 1      1  2     1
 0.400000 +1                                                                                                   1
 0.375000 +1                     1                                 1
 0.350000 +            1       1            1      1  1                                                        1
 0.325000 +1   1             2   1      2   1    1    1                       1
 0.300000 +2          1             1       1    1           1                             1
 0.275000 +                 1    1       1                   4                                                 1
 0.250000 +          1    1    1               1             1   1       1
 0.225000 +1           2    1  1    1   1            1       4   1                                             1
 0.200000 +1    1    1 1 1  11  1   3       2    1           3     1
 0.175000 +2                1            1             2                      1
 0.150000 +        1  1  1  1   112                          2      1                 1                        1
 0.125000 +2   1   21        1      4 2 1   3    1     1     1           1    1
0.1000000 +4     1  12 3       3      1     1        11      2      1
0.0750000 +2        111  11 2  3    1 2  1  3    1 2   1     4         1 1                                     1
0.0500000 +3     121  11  1 31 1 1  3 2 23  4  2 1    11     2      1
0.0250000 +   1 1  1  1111114 1   1 3 1 3 1 4  1 1 2 111     3      1 2  1
  0.00000 +*  3225BD6EBD2IA Q92I3A5 U1B 9231*  4 B C 14  3   Q   1  2  A 4    5       7                        3
          -+---------+---------+---------+---------+---------+---------+---------+---------+---------+---------+
           0         1         2         3         4         5         6         7         8         9        10
       0.00000                                                                                           1.00000
```

OVERLAP OF SEACH TERM SETS

TOTAL POINTS PLOTTED:800

CHAPTER 16. DETERMINANTS OF RELEVANCE

16.1 User and context variables

One goal of searching, in any large database, is to improve access to information by presenting the user a reduced (retrieved) set of items of which as many as possible are relevant. The fraction that are relevant or partially relevant is called the precision. A second goal is to retrieve "as many as possible" of the relevant items.

In this study the relative recall has been measured by comparing the results of any one search with the union of all 9 searches for the same question.

The determinants of success may be considered on a search-wise basis, or item by item. On a search-wise basis the observed precision and recall are treated as dependent variables, and other variables are examined to explore their influence on precision and recall.

For variables describing the uses, the context, or the question, we have 40 cases. In these cases we may study the precision of the retrieved union set. Recall is not defined. For cognitive variables we cannot do a search-wise analysis because each searcher did 5 or 6 searches, which will differ in their precision and recall. For variables describing the search we have 360 cases, with each characterized by both a recall value and a precision value.

A more powerful analysis is the item-wise approach. Given a retrieved item that is relevant or partially relevant we can examine whether the characteristics of the searcher, the search or the question, user and context are different from those for items that are not relevant.

In the following detailed results we see that the item-wise approach yields relations which seem to be obscured at the search-wise level of analysis. Relations at the search-wise level are all quite small.

The user properties are determined from the question form (variables 28-36) see Chapter 8. Of these only 28-31 can be sensibly analyzed. Since only 3 users requested a precise search, the data on Precise versus Broad are of doubtful importance. The Application variable has 6 distinct values (e.g. undergraduate, faculty, etc.). The language restriction has only two values. Similarly, the time restriction variable had only two values.

The impact of these variables is studied in two ways. Where the variable is essentially binary we use the cross ratio as described in Chapter 13. Where the variable can take more than two values, we must use the analysis of variance, or simple cross-tabulation. We have selected the analysis of variance as more appropriate, using the observed values of the (search-wise) precision and recall as the dependent variables.

For cross ratios, tables have been prepared showing the value, the logarithm, the standard error and the t-value. A t-value greater than 2 is significant at 95% confidence. The reader should review the discussion of Chapter 13 on the meaning of the cross ratio. and the table of variable in Chapter 7, to recall the meaning of values above and below the cut points.

Table 16-1

INFLUENCE OF USER VARIABLES ON RELEVANCE (N unique items=5411)

Odds ratio is a measure of the relative likelihood. For example, in this study an item retrieved for a user who gave no limit on years is 27.9% more likely to be relevant than one retrieved for a user who limited the search to the last 5 years.

Variable	Odds ratio	Log odds	Std Error	t-value
LANG	0.629	-0.464	0.057	-8.234
YEARGEN	1.279	0.246	0.061	4.041

LANG = Limit Retrieval by Language of Publication;
YEARGEN = Limit Retrieval by Year of Publication;

We see that the language variable show an itemwise influence - the chance that a retrieved item will be judged relevant or partially relevant is reduced by 37% if the range of languages is not restricted to English. The chance that a retrieved item will be judged relevant or partially relevant is enhanced by 28% if the there is no restriction given on the year of publication.

Table 16-2

INFLUENCE OF USER VARIABLES ON RELEVANCE (N questions = 40)

The question-wise analysis of the impact of user variables on relevance shows no significant difference in the mean precision for the various groups of questions.Data are represented in parallel histograms for each of the three user variables that can be treated in this way. The data are analyzed by analysis of variance to determine whether the differences between groups are significant compared to the differences within groups. The dependent variable in every case is the precision of the union of retrieved sets of items. In the summary tables, the following statistics are given separately for each group: mean, Standard deviation, an alternative estimate of the standard deviation, the standard error of the mean, the upper and lower limits of the dependent variable, and the number of cases.

```
HISTOGRAM OF * QVH      *                . CASES DIVIDED INTO GROUPS BASED ON VALUES OF * APPLN    *

         GRADUATE            FACULTY             INDUSTRY            GENERAL             OTHER
MIDPOINTS
   1.020)
   0.960)                                                                                *
   0.900)
   0.840)                    ***
   0.780)
   0.720)***                 *                   *                   M
   0.660)***                 *                                                           *
   0.600)                                        *                                       N
   0.540)                    *
   0.480)M                   M                   N
   0.420)*                   ****                **
   0.360)**                  *
   0.300)*                   **
   0.240)                    **                                                          *
   0.180)*
   0.120)**                  *                   *
GROUP MEANS ARE DENOTED BY M'S IF THEY COINCIDE WITH *'S, N'S OTHERWISE
MEAN         0.485               0.497               0.485               0.760               0.658
STD.DEV.     0.242               0.239               0.255               0.000               0.377
R.E.S.D.     0.267               0.252               0.255               0.000               0.413
S. E. M.     0.065               0.058               0.114               0.000               0.217
MAXIMUM      0.785               0.905               0.785               0.760               1.000
MINIMUM      0.115               0.143               0.107               0.760               0.254
SAMPLE SIZE     14                  17                   5                   1                   3
```

Table 16-2 (continued p.2)

```
HISTOGRAM OF * QVH      *        -       . CASES DIVIDED INTO GROUPS BASED ON VALUES OF * LANG     *
         ENGLISH                                OTHER
MIDPOINTS
   1.020)
   0.960)*
   0.900)
   0.840)***
   0.780)
   0.720)***                                    ***
   0.660)****                                   *
   0.600)*
   0.540)M
   0.480)*                                      *
   0.420)****                                   M**
   0.360)**                                     *
   0.300)**                                     *
   0.240)*                                      **
   0.180)                                       *
   0.120)**                                     **
GROUP MEANS ARE DENOTED BY M'S IF THEY COINCIDE WITH *'S, N'S OTHERWISE

MEAN         0.562                                  0.424
STD.DEV.     0.247                                  0.227
R.E.S.D.     0.269                                  0.236
S. E. M.     0.049                                  0.059
MAXIMUM      1.000                                  0.785
MINIMUM      0.115                                  0.107
SAMPLE SIZE     25                                     15
```

```
HISTOGRAM OF * QVH      *              .. CASES DIVIDED INTO GROUPS BASED ON VALUES OF * YEARGEN  *

         LAST 5YR                     NO LIMIT                      15
MIDPOINTS
   1.020)
   0.960)                             *
   0.900)
   0.840)                             **                            *
   0.780)
   0.720)*                            ***                           **
   0.660)*                            ***                           *
   0.600)                                                           *
   0.540)N                                                          M
   0.480)                             M                             *
   0.420)**                           ***                           **
   0.360)                             ***
   0.300)                             ***
   0.240)                             *                             **
   0.180)                             *
   0.120)                             ****
GROUP MEANS ARE DENOTED BY M'S IF THEY COINCIDE WITH *'S, N'S OTHERWISE
MEAN         0.580                        0.479                         0.556
STD.DEV.     0.174                        0.271                         0.211
R.E.S.D.     0.217                        0.292                         0.225
S. E. M.     0.087                        0.054                         0.064
MAXIMUM      0.740                        1.000                         0.863
MINIMUM      0.413                        0.107                         0.228
SAMPLE SIZE     4                           25                            11
```

All of the effects of user variables disappear at the search wise level, where analysis of variance shows no significant difference in the overall precision of the retrieved set with variation in the purpose of the search, the language desired, on the restriction on years. The mean precision of the union is 48.5% for graduate students. The mean precision of the union is 49.7% for faculty. The mean precision of the union is 65.8% for Other, but the sample is only three cases.

The situation is essentially the same when we consider the context variables. The only significant and important results are in the cross-ratio analysis. In particular, since there are two judges for each characteristics, we could not find a way to combine the judges' scores to do an analysis of variance.

Table 16-3

INFLUENCE OF CONTEXT VARIABLES ON RELEVANCE (N distinct items found by outside searchers =3689)

There are four context variables and two quasi-context variables (estimates of context by the project searchers). The influence of these on the relevance of retrieval items is measured by the cross ratio. Values of t greater than 2 are statistically significant. Note that problem definition has a positive impact whether estimated by users or project searchers. Estimations of intent are inconsistent in their impact on relevance. The strongest positive effect is due to the estimated availability of relevant items.

Cut	Variable	Ratio	Log	Std Error	t	N
3.67	PROBDEF1	1.172	0.159	0.067	2.375	3689
2.93	INTENT1	0.742	-0.299	0.066	-4.512	3689
3.63	PROBKNO1	2.102	0.743	0.068	11.139	3689
3.47	INTKNO1	1.089	0.085	0.066	1.283	3689
3.25	PROBDEF2	1.023	0.022	0.108	0.208	2165
2.83	INTENT2	1.328	0.284	0.106	2.655	2165
2.96	PROBKNO2	1.112	0.106	0.077	1.376	3689
1.86	INTKNO2	0.909	-0.095	0.067	-1.426	3689

PROBDEF1 = Problem Definition by User;
INTENT1 = Intent by User;
PROBKNO1 = Problem-Public Knowledge by User;
INTKNO1 = Internal Knowledge of User;
PROBDEF2 = Problem Definition by Searcher;
INTENT2 = Intent by Searcher;
PROBKNO2 = Problem-Public Knowledge by Searcher;
INTKNO2 = Internal Knowledge of Searcher;
Note: The number of cases is different for PROBDEF2 and INTENT2 because these have been coded as searcher characteristics

The variable "intent" as judged by the user has a negative impact on the chance that a retrieved item will be judged relevant. When the intent variable is below 2.93 there is a 26% decrease in the chance that a retrieved item will be judged relevant

An item retrieved in response to a question for which the user judges that there is substantial public knowledge (above 3.63) is 110% more likely to be judged relevant than one retrieved in response to a question on which the public knowledge is judged to lie below this cut point.

Intent as judged by the project searcher shows an opposite correlation with the chance of relevance.

Problem knowledge, as judged by the searchers in general shows a positive influence, but at a lower level of significance and impact. An item retrieved in response to a question for which the searcher judges that there is substantial public knowledge (above 2.96) is 11% more likely to be judged relevant than one retrieved in response to a question on which the public knowledge is judged to lie below this cut point. Note that, because users were more confident that public knowledge would be found, the cut point for the users was higher.

16.2 Impact of Question Characteristics

Variables 60 - 80 refer to presumed characteristics of the question. We can consider two questions: do the two judges agree on the values of these characteristics; do the values assigned by the judges have similar impact on the relevance of retrieved items. There is no way to assign a single numerical measure of the impact, since there are two judges who do not always agree. We can, however, search for significance by preparing a table showing the t-value of the cross ratio test, for the determination of evaluation by the score as judged by each of the two judges. Where these values are consistent and of the same sign, we may conclude that the variable has some consistent effect on the chance that a retrieved item is relevant.

Table 16-4

CROSS RATIO TEST:IMPACT OF QUESTION CHARACTERISTICS (N items=3689)

Significance and sign of the impact of question characteristics on the relevance of retrieved items. A positive value larger than 2 indicates a significant positive impact of the corresponding variable on the cross ratio. A characteristic is regarded as significant only if it is significant for both judges, and with the same sign.

	Judge 1	Judge 2
CATEGORY	1.579	-6.545
CLTYSEM	0.344	-4.410
CLTYSYN	4.345	0.699 *
SPECQURY	-11.770	1.306
SPECSUBJ	-4.308	-1.366
SERCON	1.045	-7.457
CONSTRAN	1.606	3.586 *
TRANSSER	0.726	2.032 *

CATEGORY = Question Classification (Judge 1): Domain: Dialindex Categories;
CLTYSEM = Question Classification (Judge 1): Clarity: Semantics;
CLTYSYN = Question Classification (Judge 1): Clarity: Syntax;
SPECQURY = Question Classification (Judge 1): Specificity: Query;
SPECSUBJ = Question Classification (Judge 1): Specificity: Subject;
SERCONC = Question Classification (Judge 1): Number of Search Concepts;
CONSTRAN = Question Classification (Judge 1): Number of Constraints;
TRANSSER = Question Classification (Judge 1): Presuppositions: Number Transfer
CATEG2 = Question Classification (Judge 2): Domain: Dialindex Categories;
CLTYSEM2 = Question Classification (Judge 2): Clarity: Semantics;
CLTYSYN2 = Question Classification (Judge 2): Clarity: Syntax;
SPECQRY2 = Question Classification (Judge 2): Specificity: Query;
SPECSUB2 = Question Classification (Judge 2): Specificity: Subject;
SERCONC2 = Question Classification (Judge 2): Number of Search Concepts;
CONSTR2 = Question Classification (Judge 2): Number of Constraints;
TRANSER2 = Question Classification (Judge 2): Presuppositions: Number Transfer

None of the question classification variables met the simultaneous test that they have significant impact on the chance that a retrieved item is relevant, and that the impact have the same sign for both judges. The variables showing the same sign for both judges are:

An item retrieved in response to a question for which the clarity of syntax is high is more likely to be judged relevant than one retrieved in response to a question on which it is low.

An item retrieved in response to a question with a high number of constraints is more likely to be relevant than one retrieved in response to a question on which this variable is low.

An item retrieved in response to a question for which the number of concepts is high is more likely to be judged relevant than one retrieved in response to a question on which this variable is low.

16.3 Impact of Searcher Characteristics

The file of 3689 items retrieved by outside searchers provided the most powerful tool for investigating the influence of searcher characteristics on the chance that a retrieved item will be relevant or partially relevant. The test is the cross-ratio test, described in chapter 13. All possible explanatory variables were examined (in fact, all 88 variables other than the evaluation were considered.) In the following tables all those variables showing a significant and meaningful impact are summarized. We include, because it is of some general interest, the frequency of recent experience in using the DIALOG system, which is found not to have a significant impact on the chance that retrieved items will be relevant.

A illustrative table of the cross-ratio test for every variable that could relate to the relevance of unique items (whether it could be explanatory or not) is given in Table 16-14 at the end of this chapter.)

Table 16-5

CROSS RATIO TEST: IMPACT OF SEARCHER CHARACTERISTICS (N items, with duplicates =4841)

The cross ratio test is used to evaluate the impact of cognitive characteristics on the relevance of retrieved items. High RAT scores increase chance of relevance by 65%. High EAS serves depress it by 11%. AC enhances choices; CE depresses them. ACCE is a useful combined measure.

Variable	Ratio	Log	std error	t-value
FREQDIAL	1.104	0.099	0.067	1.479
RAT	1.645	0.498	0.058	8.596
EAS	0.887	-0.120	0.059	-2.022
CE	0.735	-0.308	0.059	-5.319
RO	0.910	-0.094	0.060	-1.579
AC	1.251	0.224	0.062	3.619
ACCE	1.275	0.243	0.059	4.119

FREQDIAL = Frequency of use of the Dialog system
RAT = Remote Associates Test Score (Searcher);
EAS = Employee Aptitude Survey Score (Searcher);
CE = Leaning Style Inventory (Searcher): Concrete Experience Score;
RO = Leaning Style Inventory (Searcher): Reflective Observation Score;
AC = Leaning Style Inventory (Searcher): Abstract Conceptualization Score;
ACCE = Leaning Style Inventory (Searcher): Abstract Conceptualization/conc

An item retrieved by a searcher having a high score on the remote Associates Test is 64.5 percent more likely to be relevant or partially relevant than one retrieved by a searcher with a low score.

An item retrieved by a searcher with a high value for the composite learning style score called AC minus CE is 27.5% more likely to relevant or partially relevant than one retrieved by a searcher with a low score.

There is a marginally significant (t=2.02) indication that an item retrieved by a searcher with a high value on the Employee Aptitude Survey is 11% less likely to be relevant than an item retrieved by a searcher with a low score.

16.4 Impact of Search Characteristics

In this section we consider two very different kinds of search characteristics. The first, of greatest interest in the training and selection of search intermediaries, is the characteristics of the search process (commands, terms used, cycles etc.) which might explain the relative success of some searches.

The second is the analysis of the four different types of project search, for relative effectiveness. The project searches range from an approximation to the usual practice (except that the interview was constrained to a fixed protocol, to ensure uniform treatment of searches) to a "dumb" search using only terms from the query (but with some searcher input to define the appropriate Boolean combination of terms.)

16.4.1 Impact of search efficiency variables

One of the most interesting questions to ask is how the performance characteristics of a search (numbers of relevant, partially and not relevant documents retrieved, total number of documents retrieved and most importantly, recall and precision) are related to characteristics of the search itself such as number of commands, number of cycles, number of terms, and the time used in the search.

This has been studied by three techniques, for all of the 200 searches done by outside searchers. The results are rather bleak. Tables 16-6,7,8).

We shall see that an analysis of the full file of retrieved items suggests that searches with a large number of command cycles are more likely to produce relevant items. The fact that this effect does not show through in an analysis of 200 outside searches has several possible explanations. For example, it may be that those searchers who use a large number of cycles retrieve more relevant items **and** more nonrelevant items. Thus their improved retrieval of relevant items is not revealed by their own precision scores. The second possibility is that we are uncovering the kind of small effect that only becomes apparent when a very large quantity of data is accumulated.

Logistic Regression of Precision and Recall

The key variables of precision and recall are both bounded by 0 and 1 (that is they are percentages.) In this situation it is sometimes useful to perform the so called logistic transformation. Each variable is replaced by the logarithm of the corresponding odds ratio. For example, the value 40% is transformed to logarithm of 40/60. We have performed multiple regression analysis of the transformed values of precision and recall against 4 cognitive variables, the user's estimate that information will be available, the searcher's frequency of using Dialog, and the number of terms, commands, and cycles used in the search.

Considering precision first, the logistic transformed variable is named LH. The most important explanatory variable is the user's estimate that information is available. It explains 10% of the variance in this logistic variable. The next variable to enter is the remote associates score, which is a characteristic of the searcher. It explains about an additional 5% of the variance. None of the other possible variables past the F test for entering the regression. Thus together these two variables explain 15% of the observed variation in the log of the odds ratio corresponding to the precision. As in other cases with a low R-squared value we must conclude that the bulk of the effect is not explained by variables included in this study. Of course, we cannot exclude the possibility that the bulk of the variation is due to essentially random factors highly specific to the questions and the searchers.

The situation for explaining the logistic variable corresponding to recall is substantially worse. Only 1 variable enters the regression, the difference in cognitive scores called AC-CE. It explain somewhat less than 5% of the observed variation in this logistic variable.

Table 16-6

LOGISTIC MODEL FOR RECALL AND PRECISION (N searches = 151)

This analysis sought a logistic relation between recall (SVG) or precision (SVH) and 9 candidate explanatory variables, at the search-wise level of analysis. Searches for which either recall or precision assumes the value 1 or 0 must be omitted because the transformed variable is undefined. 9 explanatory variables were allowed (describing search structure and cognitive characteristics.) Only the significant ones are reported.

Variable	Model	R-squared value
LH	PROBKNO1,RAT	14.8%
LG	ACCE	4.6%

The model defines LG = ln(SVG/(1-SVG)) and seeks a relation of the form

$$LG = A_1 xRAT+...+A_9 xSVK$$

For LH the only variables drawn into the regression are PROBKNO1 and RAT (which we would expect). Together they explain 14.8% of the variance in LG.

For LG the situation is much worse. Only ACCE enters the regression, and it explains only 4.6% of the variance.

An attempt to explain the (search-wise) levels of recall and precision with a logistic model shows that 14.8% of the variation in the logarithm of the odds (relevant or partially relevant) versus (non relevant) can be explained by the users estimate of public knowledge, and the searchers score on the remote associates test. No other variables contribute significantly, and 85.2 percent of the variation remains unexplained.

Only 4.6% of the variation in the corresponding logarithmic ratio for the recal can be explained. The leading explanatory cariable is AC minus CE.

We conclude that the effects which may be observed (see Tables 16-7a,b) at the item-wise level are not strong enough to predict the values of Precision or recall at the searchwise level, even using a logistic model. In other words, the effects of search structure are small compared to the effects of searcher cognitive characteristics, which are themselves small at the level of search-wise analysis.

Itemwise analysis of the impact of search variables

Some effects of search structure can be seen when the analysis is conducted on an itemwise basis. The analysis is conducted separately for the project searches and for the outside searches, as it is likely that the project searches, which are four searches done by the same person, will have some hidden properties (such as suppression of cycling in later searches.)

Table 16-7a

CROSS RATIO ANALYSIS:
IMPACT OF SEARCH CHARACTERISTICS (N items = 4841)

The impact of search characteristics is studied by cross-ratio analysis of all the items retrieved by outside searchers. The number of cycles is seen to have a positive effect on the probability that a retrieved item is relevant. The significant result is that more cycles increases chance of relevance by 25%. More off-line time depresses it by 13%.

Variable	Ratio	Log	std error	t-value
SVJ	1.251	0.224	0.058	3.849
SVM	0.868	-0.142	0.058	-2.447

SVJ = Number of Command Cycles Used in a Search;
SVM = Preparation Time Used in a Search;

Table 16-7b

CROSS RATIO ANALYSIS
IMPACT OF SEARCH CHARACTERISTICS (N items =4115)

The impact of search characteristics is studied by cross-ratio analysis of all the searches done by project searchers. The number of cycles is seen to have a positive effect on the probability that a retrieved item is relevant. Number of search terms, and total time used, have a negative effect

Variable	Ratio	Log	Std Error	t-value
SVJ	1.214	0.194	0.070	2.809
SVK	0.618	-0.481	0.070	-6.819
SVN	0.637	-0.451	0.068	-6.589

SVJ = Number of Command Cycles Used in a Search;
SVK = Number of Search Terms Used in a Search;
SVN = Total Time Used in a Search;

The number of cycles used has a positive impact on relevance. Items retrieved in a search with a large number of cycles are 25% more likely to be relevant or partially relevant than those retrieved in a search with a small number of cycles.

On the other hand, items retrieved in searches which take a large amount of preparation time are less likely (by 13%) to be relevant.

For the project searches three variables are found to be significant. High number of cycles produces a 21% increase in the chance of relevance

High number of search terms produces a 39% decrease in the chance of relevance

High total time produces a 36% decrease in the chance that a retrieved item will be relevant.

In order to explore whether multivariable effects were involved we also studied the multiple linear regression of variables SVE, F, G, H on the two pairs SVJ, K and SVL, M. In no case is the R-squared value greater than 5%. In other words none of these characteristics of the search has more than 5% of its observed variation explained by the number of commands or command cycles or by the on-line time or total time used in the search.

Linear regression of recall and precision

The fact that the effects described above are visible only at the item-wise level was checked by studying the linear regression of recall and precision on all of the indicated search characteristics. The results show that the effects are, in all cases, small.

Table 16-8

LINEAR REGRESSION FOR RECALL AND PRECISION (N searches = 200)

Discussion: This was a search for linear models of SVG and SVH as a function of the pairs (SVJ,SVK) or (SVL, SVM). The R-squared values are all very small. The table shows the fraction of variation that is explained by each pair of explanatory variables, for each choice of the dependent variable.

	Independent Variables	
Dependent Variable	(SVJ,SVK)	(SVL,SVM)
SVG	0.1%	2.5%
SVH	2.5%	0.7%

SVG = Search Recall;
SVH = Search Precision;

Given the various indications, at the item-wise level, that these search characteristics have an impact on the chance of relevance, we looked for regression models describing precision and recall in terms of these variables. In no case is more that 2.5% of the precision or recall explained by these variables. None of the models are significant at the 85% confidence level.

An alternative kind of search characteristic is the comparison of the project searches, which ranged from a strictly mechanical search to one involving both a restricted interview and the written question statement. The key descriptive statistics are summarized Table 16-9

Table 16-9

COMPARISON OF STATISTICS ON PROJECT VS OUTSIDE SEARCHES

The summary statistics for outside searches and project searches are assembled together.

	Outside 200 searches			Project 160 searches		
	Mean	Medn	Accum	Mean	Medn	Accum
SVA	6.89	3.0	LOW	8.57	4.0	LOW
SVB	6.63	3.0	LOW	7.58	4.0	LOW
SVC	10.68	5.0	LOW	9.57	5.0	LOW
SVD	24.21	16.0	LOW	25.72	17.0	LOW
SVE	25.03	2.0	LOW	23.40	3.0	LOW
SVF	49.24	25.0	LOW	49.12	25.5	LOW
SVG	0.20	0.12	LOW	0.25	0.17	LOW
SVH	0.54	0.57	HIGH	0.61	0.65	HIGH
SVI	15.75	14.00	--	13.00	11.00	--
SVJ	3.73	3.0	--	2.98	3.00	--
SVK	10.22	8.0	--	10.47	3.0	--
SVL	0.26	0.22	--	0.20	0.17	--
SVM	0.25	0.25	--	0.18	0.17	--
SVN	0.51	0.43	--	0.38	0.36	--

SVA = Relevant Items Retrieved in a Search;
SVB = Partially Relevant Items Retrieved in a Search;
SVC = Not Relevant Items Retrieved in a Search;
SVD = Total Number of Items Retrieved in a Search and Evaluated by the User
SVE = Items Retrieved in a Search but Not Evaluated by the User;
SVF = Total Number of Items Retrieved in a Search of a Question;
SVG = Search Recall;
SVH = Search Precision;
SVI = Number of Commands Used in a Search;
SVJ = Number of Command Cycles Used in a Search;
SVK = Number of Search Terms Used in a Search;
SVL = Online Connect Time Used in a Search;
SVM = Preparation Time Used in a Search;
SVN = Total Time Used in a Search;

"Accum" Low means cases accumulate at the low end of the scale.

The project searches have, on the average, higher recall and precision. Yet they use, on the average, fewer cycles. This underscores the fact that the relation between "more cycles" and enhanced chance of relevance is too weak to be seen at the level of search-wise analysis.

Project searchers use less connect time and less off line time. Since they do 4 searches of the same question, this is not surprising. That fact may also account for the decreased number of cycles in project searches.

The characteristics of outside searches and project searches were compared. Recall, for project searches, averages 25%, slightly higher than recall for outside searches (20%). Precision is also slightly higher, at 61% versus 54%. This underscores the absence of an inverse relation between precision and recall.

16.4.2 Impact of type of project search

The possibility of a distinction among the four types of project search was studied by analysis of variance, applied to the search-wise precision and recall. This was the only case, in this study, where significant effect were found at the search-wise level. The following tables for the analysis of variance are read in the same way as Table 16-2

Table 16-10

ANALYSIS OF VARIANCE FOR RECALL AND PRECISION OF PROJECT SEARCHES (N searches = 160)

This is a study of the distributions of the Recall and the Precision values for the four kinds of project searches. In the accompanying combined histograms each * represents one search and M represents the median value.

RECALL

```
              ************                                                           ************
 HISTOGRAM OF * SVG      *                . CASES DIVIDED INTO GROUPS BASED ON VALUES OF * TYPE      *
              ************                                                           ************

          TYPE 1                  TYPE 2                  TYPE 3                  TYPE 4
 MIDPOINTS
    1.050)
    1.000)
    0.950)
    0.900)
    0.850)*
    0.800)**                                                                      *
    0.750)                                                                        *
    0.700)*                       *                                               *
    0.650)**                                                                      *
    0.600)**                      *
    0.550)**                      ***                     *                       **
    0.500)**                      *                                               **
    0.450)*                       *                       *                       **
    0.400)**                      **                      ****                    *
    0.350)*                       *                       *****                   *
    0.300)M*                      **                                              ***
    0.250)                        ***                     **                      M
    0.200)******                  M***                    ****                    **
    0.150)**                      *****                   M**                     **
    0.100)******                  ******                  *****                   ********
    0.050)****                    ******                  ******                  *****
    0.000)****                    ****                    *********               *******
 GROUP MEANS ARE DENOTED BY M'S IF THEY COINCIDE WITH *'S, N'S OTHERWISE
MEAN          0.321                   0.231                   0.182                   0.254
STD.DEV.      0.273                   0.191                   0.165                   0.248
R.E.S.D.      0.300                   0.196                   0.179                   0.265
S. E. M.      0.043                   0.030                   0.026                   0.039
MAXIMUM       0.895                   0.711                   0.577                   0.857
MINIMUM       0.000                   0.000                   0.000                   0.000
SAMPLE SIZE     40                      40                      40                      40

       ALL GROUPS COMBINED         ******************************* ANALYSIS OF VARIANCE TABLE *******************************
(EXCEPT CASES WITH UNUSED VALUES   *
  FOR TYPE    )                    *     SOURCE              SUM OF SQUARES      DF      MEAN SQUARE   F VALUE   TAIL PROBABILITY
                                   *
MEAN                 0.247         *     BETWEEN GROUPS          0.4019        3        0.1340        2.68           0.0492
STD.DEV.             0.227         *     WITHIN  GROUPS          7.8112      156        0.0501
R,E.S.D.             0.236         *
S. E. M.             0.018         *     TOTAL                   8.2132      159
MAXIMUM              0.895         *******************************************************************************************
MINIMUM              0.000         *     LEVENE'S TEST FOR EQUAL VARIANCES    3, 156                    6.09           0.0006
SAMPLE SIZE            160         *******************************************************************************************
                                   *     ONE-WAY ANALYSIS OF VARIANCE
                                   *     TEST STATISTICS FOR WITHIN-GROUP
                                   *     VARIANCES NOT ASSUMED TO BE EQUAL
                                   *        WELCH                         3,  85                    2.70           0.0506
```

Table 16-10 (page 2.) Analysis of Variance for Precision

```
1PAGE   5 BMDP7D  TEFKO Q013
            *************                                                      *************
HISTOGRAM OF * SVH      *                 . CASES DIVIDED INTO GROUPS BASED ON VALUES OF * TYPE     *
            *************                                                      *************

        TYPE 1                  TYPE 2                  TYPE 3                  TYPE 4
MIDPOINTS
   1.050)
   1.000)
   0.950)*********              *******                 *****                   *********
   0.900)**                     ***                     *                       *
   0.850)*                      ***                     **                      ***
   0.800)*****                  **                      ***                     ***
   0.750)                       ****                    ***
   0.700)*                                              **                      ***
   0.650)**                     *                       *                       **
   0.600)M                      M**                     ***                     M
   0.550)****                   **                      M**                     *
   0.500)**                     ***                     *                       ***
   0.450)
   0.400)****                   ***                     *****                   **
   0.350)***                                            *
   0.300)*                                              **                      ****
   0.250)*                      **
   0.200)*                      **                      *
   0.150)                       **                      **                      ****
   0.100)*                      *                       *                       *
   0.050)                                                                       *
   0.000)**                     **                      ****                    **
GROUP MEANS ARE DENOTED BY M'S IF THEY COINCIDE WITH *'S, N'S OTHERWISE
MEAN          0.638                   0.633                   0.566                   0.610
STD.DEV.      0.307                   0.319                   0.322                   0.338
R.E.S.D.      0.334                   0.342                   0.347                   0.374
S. E. M.      0.049                   0.050                   0.051                   0.053
MAXIMUM       1.000                   1.000                   1.000                   1.000
MINIMUM       0.000                   0.000                   0.000                   0.000
SAMPLE SIZE     40                      40                      40                      40

      ALL GROUPS COMBINED        ****************************** ANALYSIS OF VARIANCE TABLE ******************************
(EXCEPT CASES WITH UNUSED VALUES  *
  FOR TYPE    )                   *   SOURCE            SUM OF SQUARES     DF     MEAN SQUARE   F VALUE   TAIL PROBABILITY
                                  *
MEAN               0.612          *   BETWEEN GROUPS          0.1291        3        0.0430       0.42         0.7419
STD.DEV.           0.320          *   WITHIN  GROUPS         16.1512      156        0.1035
R.E.S.D.           0.346          *
S. E. M.           0.025          *   TOTAL                  16.2804      159
MAXIMUM            1.000          ****************************************************************************************
MINIMUM            0.000          *   LEVENE'S TEST FOR EQUAL VARIANCES      3, 156                    0.29         0.8293
SAMPLE SIZE          160          ****************************************************************************************
                                  *   ONE-WAY ANALYSIS OF VARIANCE
                                  *   TEST STATISTICS FOR WITHIN-GROUP
                                  *   VARIANCES NOT ASSUMED TO BE EQUAL
```

We see that the values of recall tend toward the lower end of the scale, and all distributions are skewed. Hence the F-test for analysis of variance is of doubtful applicability. The data do suggest that the observed differences in the means are statistically significant.

Search type 1 has the highest mean recall at	0.321
followed by type 4	0.254
type 2	0.231
type 3	0.182

F-test probability 0.0506 or 0.0497 (depending on the choice of test).

The data for precision are seen to accumulate at the high end, presumably due to small retrieved sets with 100% relevance. The distributions are similar to the eye, and the analysis of variance confirms that impression.

In other words, analysis of variance to compare the recall levels of the four types of project searches reveals a significant differences (at 95% confidence). The recall of method 1 (Interview based) is 32%; the recall of method 3 (dumb search base don terms) is 18%.

A corresponding analysis for precision reveals no significant difference

Impact of multiple retrieval on relevance.

We recall here the results of Chapter 15, Tables 15-4.1,4.2. They show that the more often an item is retrieved by different outside searchers the more likely it is to be relevant.

Table 16-11

INFLUENCE OF MULTIPLE RETRIEVAL ON RELEVANCE

The chance that an item will be relevant, as opposed to non-relevant, is strongly affected by the number of distinct outside searchers who retrieved that object. This effect has been discussed earlier, in relation to overlap. It is repeated here because it has an impact on relevance. Note that in this analysis the "partially relevant" items are disregarded.

Retrieved by n Searchers	Rel	Not Rel	Odds
All	924	1793	0.52
1	620	1544	0.40
2	185	174	1.06
3 or more	119	75	1.59

The odds that an item will be relevant, as opposed to nonrelevant (ignoring the partially relevant items) increases rapidly with the number of independent searchers who retrieve it. The odds rise from 4 to 10, for an item retrieved by only one searcher, to 16 to 10, for an item retrieved by three or more searchers.

16.5 The cut points for cross ratio analysis

The cut points for the cross ratio analysis are reported in Chapter 13, Table 13-2. They provide the numerical value that distinguishes low and high scores on various explanatory variables. If they were to be recalculated for a different selection of serches, searchers or questions, the cut points would in general be different. However, the type of relation that is analyzed here would still appear, possibly with a changed numerical value.

The ideal way to determine cutpoints would be to desing a prospective experiment using a random sample of questions and searchers. The cutpoints for those sample would be typical of thepopulation as a whole, and so, presumably, would be the cutpoints for the characteristics of the searches that result. In summary, the technique of cross-ratio analysis can uncover relationships which ought then to be tested on a random sample from the population of questions and searchers.

16.6 Summary of statistical tests applied

Very few stones are unturned in our search for explanatory relations among the data. This is best seen from the following summary of the specific programs which have been written and run during the analysis. The number of tables produced by each run is shown in the last column. It is a good indicator of the number of relations that have been examined.

In Table 16-12 we present a list of the data files used. In Table 16-13 we list the analyses that were done.

Discussion of Table 16-12

Data were collected on the numerous forms shown in the appendices. From there the data were entered, generally, into dBase files. The data were then extracted from the dBase files into ASCII files in a standard fixed field format. These data refer to properties of the context, the question, the searcher or the search. They are then joined with a file that we have called the backbone. Each case in the backbone contains the following data elements: question number, search number, searcher number, data base, item number and evaluation.

Special programs were written, in the BASIC language to perform the equivalent of a data base join operation. In this way the values of all the variables specific to search, searcher, context or question can be added to the specific item to which they refer. In fact, because of limitations and space, each of these variables was reduced to a binary variable, taking the value "1" or "2", according as the variable was above or below the cut point shown in Table 13-2.

Thus the large joined files contain full information on the backbone data, together with a flag for each of the other variable indicating whether it was above or below the cut point. This file was then reduced in several ways according to the needs of the analysis. One reduction is the removal of duplicate items, so that each item is represented in the file only once. In this file the searcher variables become irrelevant, as cases or records only represent the first searcher who happened to retrieve the item. Similarly, since an item may be retrieved in several searches, the search variables become irrelevant. On the other hand, characteristics of the context and the question, and of the user remain meaningful.

A further reduction was to separate the file into those items that had been recovered by outside searchers, and those recovered in project searches. These files are needed for the detailed analysis of multiple retrieval of an item by outside searchers, or comparison of the four types of project search.

The file called ADDQD.OUT is the combined data from all the files of the form described elsewhere in the report, containing data on individual questions. The files called J* are the ASCII files formed from the dBase files described above.

The files called JOIN* are joins as described above.

Finally, four data files were compiled containing the fundamental input information on overlap for the 200 outside searches. Each of the records in these files contains 4 overlap values, so there are together 200 distinct cases.

Table 16-12

DATA FILES

The analysis was based upon a set of files as described in Chapter 13. A more detailed description, with their working names, is given here.

File Name	Records	Description
BACKBONE.OUT	8956	Backbone file to join
BACKBONE.TRF	8956	" after transform (R,P,N,E) to (1,2,3,4)
BACKBONE.RED	5411	Reduced backbone file -- removing duplicate
BACKBONE.RTR	5411	" after transform (R,P,N,E) to (1,2,3,4)
BACKBONE.SCH	360	Reduced backbone file -- unique question and searcher
BACKBONE.CNT	3689	Reduced backbone file -- unique accession no's, add count
ADDQD.OUT	360	Combined QUES*.OUT file
JFORM5.TXT	40	Form 5 dbase file
JFORM3.TXT	52	Form 3 dbase file
JFORM78.TXT	40	Form 7 & 8 dbase file
JSCONTXT.TXT	360	Scontxt dbase file
JFORM11.ORG	176	Form 11 dbase file. From Phase I project
JFORM11.TXT	40	" -- Reduced to 40 searchers we need
JSCORE.TXT	52	Score dbase file. Cognitive variables
JOIN.OUT	8956	Join BACKBONE.OUT with transformed Dbase files
JOIN.RED	5411	Join BACKBONE.RED with transformed Dbase files
JOIN.SCH	360	Join BACKBONE.SCH with Dbase files
JOININ.SCH	160	Join BACKBONE.SCH with Dbase files -- Project searchers
JOINOUT.SCH	200	Join BACKBONE.SCH with Dbase files -- Outside searchers
JOIN7.OUT	5411	Join BACKBONE.RED with JFORM78.TXT+JSCONTXT.TXT
OVERLAP.EVL	200	Overlap for Evaluated accession numbers
OVERLAP.RPR	200	" Rel+P.Rel
OVERLAP.NOT	200	" Not Evaluated

Table 16-13

PROGRAM FILES

Files are grouped according to query number (an internal working number). As a query (such as Q01) was elaborated, digits were added to its code, as in a Dewey decimal scheme. Thus Q013 was the third variant of the problem originally described as Query 1.

Q#	File Name	Date	Input File	Description	Number of Tables
1	Q011.BMD	7/29/86	JOININ.SCH	Crosstables between (SVG1,SVG2,SVG3,SVG4) and (SVH1,SVH2,SVH3,SVH4)	12
	Q012.BMD	7/29/86	JOININ.SCH	Histograms for G12,G13,G14,G23, G24,G34,H12,H13,H14,H23,H24,H34	12
	Q013.BMD	8/13/86	JOININ.SCH	Analysis of variances by type SVG,SVH	2
2	Q021.BMD	7/29/86	JOINOUT.SCH	Regression (RAT,...,AERO) x (SVA,...,SVN)	8x14
	Q022.BMD	7/31/86	JOINOUT.SCH	Cross tables LSI x (SVA,...,SVN)	14
3	Q031.BMD	7/29/86	JOINOUT.SCH	Regression (SVI,SVJ,SVK) x (SVG,SVH,SVL,SVM,SVN)	15
	Q032.BMD	7/29/86	JOINOUT.SCH	Regression (SVI,SVJ,SVK) x (SVG,SVH,SVL,SVM,SVN)	15
4	Q04.BMD	7/29/86	JOININ.SCH	Regression (QVA,...,QVF,QVH) x (UVA,...,UVE)	7x5
5	Q05.BMD	7/31/86	JOININ.SCH	Crosstables (QVA,...,QVF,QVH) x (PREBRD,APPLN,LANG)	7x3
6	Q06.BMD	7/29/86	JOINOUT.SCH	Regressions (SVF,...,SVN) x FREQDIAL	9
7	Q071.BMD	7/29/86	JOINOUT.SCH	Regressions (SVA,SVB,SVC,SVD,SVG,SVH) x (SVI,SVJ,SVK,SVL,SVM,SVN)	6x6
	Q072.BMD	7/29/86	JOININ.SCH	" "	6x6

8	Q08.BMD	7/29/86	JOININ.SCH	Regression (QVA,...,QVF,QVH) x (PROBDEF1, INTENT1,PROBKNO1,INTKNO1)	7x8
9	Q09.BMD	7/31/86	JOININ.SCH	Histograms V51-V55,V52-V56,V53-V57,V54-V58, V59-V70,...,V69-V80	15
10	Q10.BMD	7/29/86	JOININ.SCH	Regression (UVA,UVB,UVC,UVD,UVE) x (PROBDEF1,INTENT1,PROBKNO1,INTKNO1)	5x4
11	Q11.BMD	7/31/86	JOINOUT.SCH	Multiple regression (SVE,SVF,SVG,SVH) on (SVJ and SVK) or (SVL and SVM)	4x2
12	Q12.BMD	7/31/86	JOINOUT.SCH	Stepwise regression (LG,LH) on (RAT,EAS,ACCE,ARRO,PROBKNO, FREQDIAL,SVI,SVJ,SVK)	1
13	Q13.BMD	7/31/86	BACKBONE.CNT	Crosstab EVAL x Count	1
15	Q15.BAS	8/18/86	JFORM78.TXT JSCONTXT.TXT	|PROBKNO1-mean(PROBKNO2)| < STD ?	1
16	Q16.AB8	8/21/86	OVERLAP.EVL	Histograms EVAL	3
			OVERLAP.RPR	RELPREL	
			OVERLAP.NOT	NOTEVAL	
17	Q17.BMD	8/18/86	JOIN.SCH	Regression SVG x SVH	1
18	Q18.BMD	8/21/86	JFORM11.ORG	Histograms V59-V70,V60-V71, ... ,V69-V80	11
19	Q19.BMD	8/21/86	BACKBONE.TRF	Crosstable EVAL x SEARCHER from BACKBONE.OUT	1
20	Q20.BMD	8/22/86	BACKBONE.RTR	Crosstable EVAL x SEARCHER from BACKBONE.RED	1
21	Q21.BMD	8/23/86	JOININ.SCH	Analysis of Variances of QVH by groups in APPLN(5),LANG(2),YEARGEN(3)	3
22	Q22.BMD	8/23/86	JOINOUT.SCH	Descriptive statistics of SVG,SVH Select if RAT > 17 and EAS > 13	2

23	Q23.BMD	8/25/86	JOIN7.OUT	Crosstables EVAL x (PROBDEF2,INTENT2) with new cutpoints (3.25,2.825)	2
24	QIN.BMD	7/31/86	JOININ.SCH	Descriptive statistics for all variables, means, modes etc	90
25	QOUT.BMD	7/31/86	JOINOUT.SCH	"	89
26	TEFK03.BMD	10/10/85	JSCORE.TXT	Distribution of searcher's psychology	1
27	TEFK04.BMD	10/15/85	JSCORE.TXT	Scatter plot RAT x EAS	1
28	TEFK05.BMD	1/15/86	JSCORE.TXT	Crosstabls (RAT,EAS) x (CE,RO,AC,AE)	8
29	TEFK06.BMD	6/25/86	ADDQD.OUT all Dbase files	Descriptive statistics for all variables in ADDQD.OUT,JFORM5.TXT, JFORM3.TXT,JFORM78.TXT,JSCONTXT.TXT, JFORM11.TXT,JSCORE.TXT	7
30	TEFK07.BMD	6/25/86	JOIN.OUT	Crosstables EVAL x Xvariables	88
	TEFK072.BMD	"	JOIN.RED	"	50
	TEFK073.BMD	"	JOIN.SCH	"	88
31	T07IN.BMD	7/8/86	JOININ.OUT	Crosstables EVAL x Xvar - Inside	88
	T072IN.BMD	"	JOININ.RED	"	50
32	T07OUT.BMD	7/8/86	JOINOUT.OUT	Crosstables EVAL x Xvar - Outside	88
	T072OUT.BMD	"	JOINOUT.RED	"	
33	TEFK08.BMD	6/26/86	JSCONTXT.TXT	Scatter plots (PROBKNO2,INTKNO2) x Question #	2
34	TEFK09.BMD	6/26/86	JSCONTXT.TXT	Descriptive statistics of all variables by questions	1
35	TEFK10.BMD	6/26/86	JFORM11.TXT	Crosstables (variables in Judge 1) x (variables in Judge 2)	11

Discussion of tests that have been performed

The range of possible relations investigated is shown in Table 16-13. We briefly summarize what these various research queries involved. A research query (Q#) is not to be confused with a study question (of which there were 40)

Q#1 The first set of queries, involving a total of 26 analyses were the search for relations among the project searches. We analyzed crosstabulations of the precision and recall by type, prepared histograms for the difference between precision and recall for all possible pairs of types, and performed analysis of variance by type for the precision and recall. The last was successful and is described in the report.

Q#2 In analysis of psychological variables we performed linear regressions, with either variable treated as independent, on the ordinal scale psychological variables (RAT,...,AERO), against all of the search variables (SVA,...,SVN). This was a total of 104 analyses. We also prepared crosstabulations of the learning styles inventory against all 14 search variables. No significant results were found.

Q#3 We also performed regressions of the variables describing the search structure, (SVI...SVK) against the precision recall and time measures. These 15 analyses produced no significant results.

Q#4 We performed 35 regression analyses on the relation between questions variables (QVA...QVH) and the user variables (UVA...UVE), which referred to user evaluation. Only the obvious results, that users were more satisfied when they had more relevant items was observed.

Q#5 21 crosstabulations were prepared of question variables against the user variables that restrict the search. No significant results were found.

Q#6 Regression of all search variables against the frequency of use of dialog was performed (9 regressions). No significant results were found.

Q#7 All search variables having to do with retrieved items were analyzed by regression against all variables having to do with the structure and time of the search (36 analyses). No important results were found. This analysis was performed separately for searches done by project searchers and by outside searchers.

Q#8 Regression analysis for all project searches was performed for question variables against context variables as defined by the user. A total of 56 regressions with no significant results.

Q#9 Histograms were prepared of the difference between the judges' scores for the context variables and for the question classification variables, a total of 15 histograms. The results are summarized elsewhere in the report.

Q#10 20 regression analyses were performed on the user variables against context variables. No significant results were found.

Q#11 8 regressions were performed to analyze multiple regression of search variables SVE...SVH for their dependence on either terms and cycles, or time used. The results are described earlier in this chapter.

Q#12 Stepwise linear regression was performed for the logistic transformed precision recall for all outside searches to study dependence on all searcher characteristics and search structure characteristics SVI...SVK, as well as the searchers estimate of public knowledge.

Q#13 For all outside searches a crosstabulation of the relevance by the number of times retrieved was performed. This led to extremely significant results which are discussed elsewhere in the report.

Q#14 was not assigned to a task

Q#15 The distribution of searcher estimates of public knowledge was compared with the user estimate of public knowledge.

Q#16 Overlap of searches was measured through overlap of retrieved items resulting in three histograms presented elsewhere in this report.

Q#17 The precision recall relationship was tested by regression of precision and recall. The results are described elsewhere in this report.

Q#18 Eleven histograms were prepared on the difference of the scores assigned by two judges for the question variables. The results are summarized in the report.

Q#19,Q#20 Crosstabulations were prepared for all items retrieved and for unique items retrieved to give the searcher classification (outside or the four project types) by evaluation. The results are summarized elsewhere in the report.

Q#21 Analysis of variance of precision was performed by groups for user variables restricting the search.

Q#22 Descriptive statistics were formed for a set of searchers who had high scores on both the RAT and the EAS. The results were not significantly different from those for all outside searchers.

Q#23 Crosstabulation was formed for the evaluation by the project searcher's judgement of problem definition and intent with revised cutpoints.

Q#24,Q#25 Ninety tables of descriptive statistics were prepared for all project searchs. 89 tables of descriptive statistics were performed for all outside searches. Distribution plots were formed for all of the cognitive variables.

Q#27 Scatter plot and regression analyses were attempted for RAT by EAS with no significant result.

Q#28 RAT and EAS were crosstabulated with the four components of the learning style inventory with no significant results. Descriptive statistics were prepared for all the database files describing the data collected on various forms.

Q#30,Q#31,Q#32 Numerous tables were prepared crosstabulating evaluation by reduced variables which we call Xvariables, which are the flags indicating whether a variable is above or below its cutpoint.

Q#33 Scatter plots were prepared for context variables by question number with no significant results.

Q#34 Descriptive statistics were prepared for all variables by questions.

Q#35 Crosstabulation was formed for variables established by Judge 1 with variables established by Judge 2.

SUMMARY OF THE PROGRAM PRINTOUTS FROM WHICH SPECIFIC CONCLUSIONS HAVE BEEN DERIVED

Table 16-1	T072
Table 16-2	Q21
Table 16-3	T07OUT
Table 16-4	T07out
Table 16-5	T072OUT
Table 16-6	Q012
Table 16-7a	TEFKO07
Table 16-7b	T07IN
Table 16-8	Q011
Table 16-9	QIN,QOUT
Table 16-10	Q013
Table 16-11	Q13

References to the BMDP manual.

The page references for the particular tests used are as follows:

Data Description: P1D, P2D, P4D	PP 73-92
Two-way analysis: P7D	PP 93-122
Linear Regression: P1R;P2R	pp 235-263
Two-way measures assciatn P4F	pp 143-206

Table 16-14

EXAMPLE CROSS-RATIO DATA (N unique items, outside=3689)

The data presented throughout this report are based on a division of unique items into those retrieved by project searchers and those retrieved by outside searchers. In an alternative analysis, the items retrieved by outside searchers are counted unique if no other outside searcher found them. (This data was needed to analyze the influence of multiple retrieval.) Comparison of these data with those reported elsewhere in the report shows that the choice of which data file is analyzed does not alter the key conclusions. The value of the odds ratio may change by a few percent, according to which file is used to analyze the data.

Table #	Content			Odd Ratio	LN(Odd Ratio)	ASE1	T-VALUE
1	EVAL	x	QVA	2.726	1.003	0.068	15.230
2	EVAL	x	QVB	2.175	0.777	0.067	11.787
3	EVAL	x	QVC	0.232	-1.462	0.070	-22.198
4	EVAL	x	QVD	1.365	0.311	0.089	3.510
5	EVAL	x	QVE	1.426	0.355	0.067	5.307
6	EVAL	x	QVF	1.426	0.355	0.067	5.307
7	EVAL	x	UVA	0.918	-0.086	0.066	-1.312
8	EVAL	x	UVB	1.287	0.252	0.080	3.151
9	EVAL	x	UVC	2.036	0.711	0.069	10.512
10	EVAL	x	UVD	1.839	0.609	0.067	9.186
11	EVAL	x	UVE	1.732	0.549	0.067	8.230
12	EVAL	x	PREBRD	3.254	1.180	0.153	8.764
13	EVAL	x	APPLN	1.103	0.098	0.076	1.292
14	EVAL	x	LANG	0.597	-0.516	0.068	-7.640
15	EVAL	x	YEARGEN	1.225	0.203	0.075	2.708
16	EVAL	x	YEARSP1	1.225	0.203	0.075	2.708
17	EVAL	x	YEARSP2	1.225	0.203	0.075	2.708
18	EVAL	x	SUGDB1	1.276	0.244	0.096	2.566
19	EVAL	x	SUGDB2	1.565	0.448	0.110	4.165
20	EVAL	x	SUGDB3	1.603	0.472	0.131	3.693
21	EVAL	x	PROBDEF1	1.172	0.159	0.067	2.375
22	EVAL	x	INTENT1	0.742	-0.299	0.066	-4.512
23	EVAL	x	PROBKNO1	2.102	0.743	0.068	11.139
24	EVAL	x	INTKNO1	1.089	0.085	0.066	1.283
25	EVAL	x	PROBDEF2				
26	EVAL	x	INTENT2				
27	EVAL	x	PROBKNO2	1.112	0.106	0.077	1.376
28	EVAL	x	INTKNO2	0.909	-0.095	0.067	-1.426
29	EVAL	x	CATEGORY	1.111	0.105	0.067	1.579
30	EVAL	x	CLTYSEM	1.027	0.027	0.078	0.344
31	EVAL	x	CLTYSYN	1.436	0.362	0.084	4.345

32	EVAL	x	CLTYAVG	1.150	0.140	0.068	2.063
33	EVAL	x	SPECQURY	0.433	-0.837	0.074	-11.770
34	EVAL	x	SPECSUBJ	0.747	-0.292	0.068	-4.308
35	EVAL	x	SPECMEAN	0.514	-0.666	0.069	-9.767
36	EVAL	x	SERCONC	1.045	0.044	0.067	0.658
37	EVAL	x	CONSTRAN	1.606	0.474	0.072	6.636
38	EVAL	x	TRANSSER	0.726	-0.320	0.159	-2.033
39	EVAL	x	FINAL				
40	EVAL	x	CATEG2	0.647	-0.436	0.067	-6.545
41	EVAL	x	CLTYSEM2	0.720	-0.329	0.075	-4.410
42	EVAL	x	CLTYSYN2	1.085	0.082	0.117	0.699
43	EVAL	x	CLTYAVG2	0.774	-0.256	0.074	-3.470
44	EVAL	x	SPECQRY2	1.090	0.086	0.066	1.306
45	EVAL	x	SPECSUB2	0.912	-0.092	0.067	-1.366
46	EVAL	x	SPECMEN2	1.172	0.159	0.066	2.410
47	EVAL	x	SERCONC2	0.611	-0.493	0.067	-7.457
48	EVAL	x	CONSTR2	1.279	0.246	0.069	3.586
49	EVAL	x	TRANSER2	1.640	0.495	0.254	2.023
50	EVAL	x	FINAL2	Not applicable			

17. CONCLUSIONS

17.1 Overview

This study addresses human aspects and decisions in information retrieval. The aim of the study is to contribute to a formal or scientific characterization of the elements involved in information seeking and retrieving, particularly in relation to cognitive decisions and human-system interaction.

The objectives were to conduct a series of observations or experiments under as real-life conditions as possible on the following entities or classes of variables:

1. Users who have questions for information retrieval systems and the context of their questions
2. Questions, structure and classification
3. Searchers, cognitive traits and online experience
4. Searches, effectiveness, efficiency characteristics, and overlap
5. Items retrieved, distribution and the variables that affect retrieval of items judged relevant by users

Involved were:

... 40 questions posed by 40 users

... 36 outside searchers, 3 project (staff) searchers, and 1 additional analyst for question classification for a total of 40 searchers

... 9 searches for each question for a total of 360 searches

... 8956 retrieved items for all of the 360 searches (including duplicates)

... 5411 retrieved items for all searches after duplicates were eliminated

... these 5411 unique retrieved items evaluated by users for relevance

... an assortment of measures and indicators pertaining to every one of the five entities ennumerated above and resulting in:

... a total of 90 variables used in some way or another in the analysis.

The study involved a large amount of data and a long list of statistical correlations and tests. Many of these, as expected, did not find statistically significant results or explanations. In the presentation of results we have highlighted the quantified characteristics of the ennumerated entities and presented details of a number of statistical analysis concentrating on those producing significant and important results.

In the process, a number of specific conclusions were made drawing from data in the accompanying tables. In this chapter we are translating the specific conclusions into a series of more general statements. The specific conclusions made in the chapters on results (Chapters 8 through 16) are extracted (with references to appropriate tables) and placed as supportive evidence under the general statements. In this way, this concluding chapter stand on its own summarizing the whole study.

There is, of course, a limit to our conclusions. As mentioned in the Preface, we cannot claim generalizations beyond our sample, any more than any other similar study has been able to claim. Still, we are offering these general conclusions to be taken with all due caution for discussion, confirmations, refutation or as hypotheses for further and in-depth studies.

17.2 Users and Question Context

1. Of the four characteristics in the context of user questions: (i) problem definition (how clearly was it defined); (ii) intent (how specific was the purpose of use); (iii) internal knowledge (about the problem at hand); and (iv) public knowledge estimate (does information on the problem exist), every variable except internal knowledge showed a significant impact on the chance of retrieval of relevant items. (Relevant and partially relevant items were considered together and labeled 'relevant' in all the analyses except one.) The better the problem was defined, the better the chance that retrieved items were relevant. The less specific the intent, the lesser the chance that a retrieved item was relevant. When estimates of the existence of public knowledge were high, the chance that a retrieved item was relevant was also very high.

> ... An item retrieved in response to a question for which the underlying problem was considered well defined (above the cut point of 3.67 on a 5 point scale) was 17% more likely to be judged relevant (Table 16-3)
>
> ... An item retrieved for a question for which intent for use of the information was narrowly defined (below 2.93 on a 5 point scale) was 27% less likely to be judged relevant (Table 16-3)
>
> ... An item retrieved for a question for which the the user believed that there was substantial public knowledge in existence about the problem (above the cut point of 3.63 on a 5

point scale) was 110% more likely to be judged relevant than an item retrieved for a question for which public knowledge was judged to exist to a lesser extent (below the cut point) (Table 16-3)

17.3 User Constraints on Questions

2. Of the four conditions users imposed on the searches of their questions, (i) precise or broad; (ii) type of application (graduate study, faculty research, industrial, general); (iii) English only or any language; and (iv) restriction on years of publication (last 5 years; no limits; specific years), only specification of language and years of publication showed a significant impact on the chance that a retrieved item was judged relevant. None of the variables had significant effects on the precision of the retrieved set as a whole.

> ... the chance that a retrieved item will be judged relevant is reduced by 37% if the range of languages is not restricted to English (Table 16-1)
>
> ... the chance that a retrieved item will be judged relevant is enhanced by 28% if there is no restriction given on the year of publication (Table 16-1)
>
> ... the mean precision for questions categorized by application are: faculty research 50%, graduate study 49%, industry 49%, other 66% (Table 16-2)
>
> ... the mean precision for questions restricted to English was 56% and for questions not restricted by language it was 42% (Table 16-2)
>
> ... the mean precision for questions restricted to the last 5 years was 58%, to no limit on years 48%, and to last 15 years 56% (Table 16-2)
>
> ... the mean precision for all questions (i.e., union of output for 9 searches for each question) was 51%.

17.4 Consistency and Estimate of Context by Searchers

3. The judgement between users and searchers on the four characteristics of question context (indicated on a five point scale) showed substantial consistency or agreement on problem definition, followed by intent. Agreement on estimates of public knowledge was low: users judged it considerably higher. The users estimate of their internal knowledge as expected was higher than searchers. Thus on some context characteristics searcher estimates of context significantly paralleled user estimates.

... On problem definition 15 out of 40 cases had exact agreement; 14 of the remaining cases differed by one point on the scale (Table 14-1)

... On intent in 11 cases out of 40 there was exact agreement and in 25 cases there was agreement within one point (Table 14-1)

... On estimates of the probability that information exists in public knowledge exact agreement occurred for only 6 cases and agreement within one point in only 16 (6 + 10) (out of 40) cases, for a total of 16 cases of either exact agreement or agreement within one point. The most common occurrence (8 cases) was a difference of 2 points. The user's estimate was 2 points higher than the searcher's estimate (Table 14-1)

... On internal knowledge (as expected) on 26 of the cases the user's estimate (of his or her personal knowledge) was two or more units higher than the searcher's estimate (Table 14-1)

4. Of the four characteristics of context of questions judged by searchers (as opposed to users) problem definition and internal knowledge had no significant impact on the chance of retrieval of relevant items, while intent and public knowledge had a small effect.

... User's intent as assessed by the searchers showed an opposite correlation from the user's own assessment of the chance of relevance (Table 16-3)

... When searchers assessed user's intent as narrowly defined (above the cut point of 2.83 on a five point scale) an item retrieved was 32% more likely to be relevant (Table 16-3)

... An item retrieved in response to a question for which a searcher assessed substantial public knowledge (above 2.96) was 11% more likely to be judged relevant than one retrieved in response to a question on which the public knwoledge was judged below this cut point (Table 16-3)

17.5 Consistency of Judgement on Question Classification Between Two Judges

5. With regard to question classification, there was substantial agreement between two judges in a number of categories used for classification of questions: (i) domain (as expressed by the number of Dialindex categories); (ii) clarity of semantics; (iii) clarity of syntax; (iv) specificity of the subject of the question; and (v) constraints in the question. There was poor agreement on: (i) specificity of the query (about the subject) of the question, and (ii) complexity or number of concepts in the question. Overall, question classification as it was designed seems to be valid to a great extent.

... On the estimate of domain (the number of Dialindex categories), the two judges agreed exactly 16 times out of 40 and were within one unit 30 (16 + 14) times out of 40 (Table 14-2 for this and all of the following conclusions)

... On clarity of semantics, the judges exactly agreed 23 times and were within 1 unit 31 times

... On clarity of syntax, the judges exactly agreed 29 times and were within 1 unit 34 times. This resulted in perfect agreement on the average clarity score (semantics and syntax) in 20 cases and agreement within one unit in 38 cases

... On specificity of the subject, there was exact agreement in 19 cases and agreement within one unit in 35 cases

... With regard to specificity of the query about the subject, agreement was not good at all. Disagreement ranged from -4.75 to +3.7. There was agreement to within one unit in only 17 of the 40 cases. The mean specificity score was widely scattered due to the lack of inter-judge agreement on specificity of the query

... On complexity, the two judges agreed in only five cases on the number of search concepts involved in the question, and one of the judges estimated the number of concepts was greater than the number estimated by the other judge in 30 of the 40 cases

... There was substantial agreement on the number of constraints: 20 cases out of 40. One of the judges estimated the number of constraints was greater than the number estimated by the other judge in the remaining 20 cases

... In the study of the additional 176 questions, the percent of inter-judge agreement was higher than on the 40 questions in the study but categories for which there was the 'most agreement' and the 'least agreement' were still the same as described above (Table 14-3)

17.6 Impact of Question Classification Categories

6. None of the question classification categories had, at the same time, a significant impact on the chances for retrieval of relevant items and impact on relevant retrieval in the same direction (same sign) for both judges classifying the questions. However, for three categories both judgments were in the same direction and there was some significance in effects on retrieval for: 1. clarity of syntax, 2. number of constraints, and 3. number of concepts:

... An item retrieved in response to a question for which the clarity of syntax was high was more likely to be judged relevant than one retrieved in response to a question in which clarity of syntax was low (Table 16-4 for this and the following conclusions)

... An item retrieved in response to a question with a larger number of constraints was more likely to be relevant than one retrieved in response to a question with a fewer number of constraints

... An item retrieved in response to a question with a greater number of concepts was more likely to be judged relevant than one retrieved for a question with a lesser number of concepts

... In other words, clearly structured questions with a greater number of concepts and constraints significantly favored retrieval of relevant items.

17.7 Searcher Characteristics

7. Some cognitive characteristics (as measured by the respective tests) had positive and others negative impact on relevance of retrieved items. Positive impact resulted from higher scores on the Remote Associates Test (RAT) (relating to semantic association); the Abstract Conceptualization (AC) learning mode from the Learning Style Inventory (LSI) (relating to "the ability to generate concepts that integrate observations into logically sound theories") and higher scores on the combined LSI score, Abstract Conceptualization-Concrete Experience, indicating the extent an individual emphasizes abstractness over concreteness in learning style. Negative impact resulted from high scores on Employee Aptitude Survey (EAS) (relating to deductive inference ability tested by solving questions involving symbolic inequalities) and having a Concrete Experience (CE) learning mode from LSI (relating to "the ability to involve oneself fully, openly and without reservation in new experiences"). Other learning modes had no impact.

... An item retrieved by a searcher who scored high on the Remote Associates Test was 65% more likely to be relevant than one retrieved by a searcher with a low score on the test

... An item retrieved by a searcher ranking high on the Abstract Conceptualization learning mode was 25% more likely to be relevant than one retrieved by a searcher with a low score in that mode

... An item retrieved by a searcher with a high value in the composite learning style score called AC minus CE was 27.5% more likely to be relevant than one retrieved by a searcher with a low score on that style

... A searcher with a high Concrete Experience score had decreased chances of retrieval of relevant items by 27%

... There was a marginally significant indication that an item retrieved by a searcher with a high score on the Employee Aptitude Survey was 11% less likely to be relevant than an item retrieved by a searcher with a low score

... Thus, if these cognitive tests measure abilities which they claim to measure, a searcher with higher verbal abilities and preferring an abstract style of learning has increased chances for retrieving relevant items and a searcher with high mathematical/logical abilities and preferring a learning style based on concrete experiences has decreased chances of retrieving relevant items.

8. Frequency of DIALOG searching had no impact on the chance that retrieved items were relevant.

... Searchers who use DIALOG daily or twice a week did not differ in retrieval of relevant items from searchers who search DIALOG once a week, twice a month, or less.

17.8 Search Efficiency Characteristics

9. Of the six measures characterizing the efficiency of the search (number of commands used; number of command cycles used from selecting terms to displaying results; number of search terms used; online connect time; preparation time; and total time) the most significant impact on increasing the chances of retrieving relevant items was command cycles used. Negative impact resulted from higher numbers of search terms and more total time spent on the search. Other factors were not significant. (Two types of searches were involved: outside searches, i.e., done by searchers searching each assigned question once, and project searches searching each question four times varying methods for each search as explained in Section 17.9).

... Items retrieved by 200 outside searches with a large number of cycles were 25% more likely to be relevant than those retrieved by searches employing a lesser number of cycles (Table 16-7a). Similarly, for 160 project searches, a greater number of cycles produced a 21% increase in the chance of relevance (Table 16-7b)

... Items retrieved by outside searches which took a greater amount of preparation time were 13% less likely to be relevant (Table 16-7a)

... The use of greater amount of total time produced a 36% decrease in the chance that a retrieved item was relevant for project searches (Table 16-7b)

... The use of greater numbers of search terms produced a 39%

> decrease in the chance of relevance for project searches (Table 16-7b)
>
> ... On the average, per search, there were: 15 commands, 3 cycles, 10 search terms, 10 minutes preparation time, 12 minutes online time, and 22 minutes total time used. However, the ranges varied widely and the distributions were either skewed in one direction or had several peaks and therefore mean values must be interpreted with caution (Table 10-3)
>
> ... None of the effectiveness characteristics of a search (total number of items retrieved, search recall, and search precision) had more than 5% of its observed variation explained by the efficiency characteristics (number of commands, cycles, and search terms, and amount of online, preparation, and total time) (Section 16.4.1)

17.9 Types of Searches

10. There was significant difference in recall but no significant difference in precision for the four different types of searches (so called project searches) based on: 1. taped interview with user on the problem underlying the question; 2. problem interview plus written question; 3. terms from the question only (no elaboration, 'dumb' search); and 4. terms from the question plus elaboration through a thesaurus.

> ... Search type 1 (problem interview) had the highest mean recall at 32%, followed by search type 4 (question and thesaurus) at 25%, then by search type 2 (problem and question) at 23%, and finally search type 3 ('dumb' search) at 18%. The distribution is skewed toward the lower end of the scale (Table 16-10)
>
> ... The mean precision was similar for all four types of searches: for type 1 and 2 it was 63%, for type 4, 61% and for Type 3, 56%. Values are skewed toward the upper end (Table 16-10)
>
> ... The best performance in recall and precision was by searches done on the basis of verbal statements obtained by interviewing the user who elaborated on the problem at hand and his or her intent for using the information. Performance was worst when words from the written questions were used alone without elaboration as if they had been picked automatically.

11. Recall and precision for project searches averaged slightly higher than for outside searches. The project searches had access to users' problem statements, the outside searches did not. Both had access to the written questions and the same thesauri for elaboration.

... Mean search recall for project searches was 25% and for outside searches it was 20%, mean precision for project searches was 61% and for outside searches, 54% (Table 16-9). This underscores the absence of an inverse relation between precision and recall as is discussed in Section 17.12.

... On the average, outside searches used more commands per search than project searches (16 vs. 13), more cycles (4 vs. 3), the same number of search terms (10), more preparation time (15 min. vs. 11 min.), more online time (16 min. vs. 12 min.) and more total time (31 min. vs. 23 min.) (Table 16-9)

17.10 Overlap of Search Terms and Items Retrieved

[Note: Each question was searched by five searches by different searchers, called 'outside searches'. The question was also searched by four project searches (see preceeding section). Overlap was studied only for the five outside searches, because they were all done on the same basis: the written question statement only.]

12. There was surprisingly low agreement on selection of search terms (on the same basis of the written question from the user) between different searchers in searching the same question.

... The mean agreement between searchers on search terms for the same question was 27% (Table 12-1). However, the distribution was very much skewed toward the low end (Table 15-1).

... In 11% of the cases there was less than 5% agreement on search terms. In 20% of the cases agreement was 10% or less. In 44% of the cases agreement was 20% or less. In 56% of the cases, agreement was 25% or less. (Table 15-1)

13. The overlap of retrieved items between different searchers searching the same question (on the same basis of written question statement) was also surprisingly low and it was even lower than the degree of agreement observed in selection of search terms. This was true in retrieval of both all items and retrieval of relevant items, however, the overlap in relevant items was slightly greater.

... The mean overlap of items retrieved for the same question by different searchers was 16% for all items retrieved and 18% for relevant items retrieved (Table 12-11). However, the distribution is skewed toward the low end. (Table 15-2 and 15-3)

... In retrieval of all items (relevant and nonrelevant), in 59% of the cases overlap was less than 5% and in 66% of the cases overlap was no more than 10% (i.e., 10% or less). (Table 15-2)

... In retrieval of relevant items, in 59% of the cases overlap was less than 5% and in 64% of the cases overlap was 10% or less. (Table 15-3)

... The low degree of overlap in selection of search terms and retrieved items was one of the most surprising findings of the study.

14. Surprisingly, the degree of agreement in search terms and the degree of agreement in items retrieved for searches of the same question are not significantly related.

... The substantial disagreement in items retrieved does not find its explanation in the much lower, but still significant, disagreement in selection of search terms. We found no significant relation between the disagreement measured by search terms and the disagreement measured by overlap in items retrieved. Only 2.5% of the variation in overlap of retrieved items can be attributed to overlap in search terms. (Table 15-5)

... This is another one of the surprising and significant findings.

17.11 Odds of Relevance in Retrieval of Duplicate Items

15. As explained, a question was searched by five searches by different searchers and the degree of agreement of all items retrieved was low. However, when an item was retrieved by more than one searcher (2, 3, 4 or 5 times) it had a surprisingly greater chance of being relevant (as opposed to nonrelevant). The more often the same item was retrieved by different searches for the same question the more likely it was to be relevant.

[Important note: In all previous and subsequent analysis, items judged by users as Relevant or Partially Relevant were treated together (R + pR), but for this analysis (to sharpen the view) only those items judged R, Relevant, were considered and pR, Partially Relevant, items were disregarded.]

... For all retrievals (those items retrieved once, twice, three times or more) the odds that the item was relevant as opposed to nonrelevant was 5 to 10. (Tables 15-4.1 and 15-4.2 for these and subsequent conclusions)

... For an item retrieved only once (in five searches) the corresponding odds were 4 to 10

... For items retrieved twice (in five searches) the odds were even, 10 to 10

... For items retrieved three or more times (i.e., three, four, or five times) the odds that the item was relevant were 16 to 10. In other words, when an item is retrieved three or more times the odds favoring relevance improve considerably.

... We consider this the most significant finding of the study.

17.12 Recall and Precision

16. The mean search recall and precision values found confirm similar figures from many other studies, however, considering the means alone is misleading because the distributions were skewed in one direction.

> ... the mean recall for all 360 searches was about 22% and the mean precision about 57% (Tables 12-1)

17. In this study, when recall was plotted against precision the two were not inversely related as they are widely considered and as the so called Cleverdon Law stated. To the contrary, when either recall or precision was considered the independent variable, the other rose slightly. As recall rose so did precision, but rather mildly; or vice versa, as precision rose do did recall, also mildly.

> ... the plot of recall and precision showed a large amount of scatter and a direct linear relation (Figure 12-1)

18. A low percentage of the variation observed in recall and in precision was explained by the variables used in this study. For the most part, we still do not know what variables have the greatest effect on recall and precision.

> ... The most important explanatory variable for precision was the user's estimate of public knowledge (i.e., the probability as predicted by the user that information about the problem at hand existed in public knowledge). This explained 10% of the observed variance. The next variable which explained 5% of the variance in precision was the searcher characteristic measured in this study by the Remote Associates Test designed to test word association ability. Together these two variables explained 15% of the variation in precision. No other variable from among those variables studied passed the test of significance. (Table 16-6)

> ... The possibility for explaining recall was substantially worse. Only one variable proved mildly significant: the cognitive score of searchers on the Learning Style Inventory (AC - CE) which identifies a style of learning in which an individual emphsizes abstractness over concreteness. It explained somewhat less than 5% of the observed variation in recall. No other possible variable passed the significance test. (Table 16-6 and 16-8)

> ... In no case was more than 2.5% of the variance observed in precision and recall explained by the efficiency variables

(i.e., number of search terms, number of commands, number of cycles, preparation time, online time, and total time); that is, by the same variables that had an impact on relevance (see Conclusion number 9). This was because the level of analysis possible for the search as a whole (the search-wise level) involving precision and recall was not sensitive enough to detect impact as did the level of analysis used for the relevance of each item retrieved (the item-wise level). (Table 16-8)

17.13 Utility Assessment by Users

19. The following four types of utility assessments by the users (of the five types of assessments used for the study) correlated positively with the chance that a retrieved item was relevant: (i) dollar value assigned to items received, (ii) overall worth of the information received in terms of time spent, (iii) contribution to resolution of the problem at hand, and (iv) overall satisfaction. The fifth measure (time spent evaluating the items received) had no effect.

> ... items retrieved in searches of questions for which the user considered the value of the information received above the cutpoint of $75 were 28% more likely to be relevant than items retrieved in searches valued below $75 (Table 16-4 for this and following conclusions)
>
> ... items retrieved in searches of questions for which the user assigned the worth of information received (in terms of the time he or she spent participating in the study) above the cutpoint of four (on a five point scale), i.e., the results were worth more than the time spent, were 104% more likely to be relevant
>
> ... items retrieved in searches of questions for which users considered the information contributed to the resolution of the problem at hand (cutpoint of 3.15 on a five point scale) were 84% more likely to be relevant
>
> ... items retrieved in searches of questions for which users indicated a high degree of satisfaction (above the cutpoint of 3.62) were 73% more likely to be relevant
>
> ... In other words, relevance of items submitted and user utility scores paralleled each other.

17.14 On the Approaches to Statistical Analysis

20. Two levels of statistical analysis were used in this study: search-wise and item-wise. On the search-wise level, explanations were sought for the impact of given variables on precision and

recall, that is on the effectiveness of the searches as a whole. On the item-wise level, explanations were sought for relevance of items retrieved on an item by item basis. The item-wise level proved much more powerful in providing explanations and insight. Results were obtained from the item-wise leveled analysis which the search-wise level analysis could not provide. While the item-wise approach to analysis is similar to analysis techniques which are common in biomedicine, to our knowledge it has not been applied in information science until this study. The results obtained here recommend its use. It seems that the notion of precision and recall of a search as a whole when used in connection with explanatory variables is in need of reconsideration.

18. DISCUSSION

The main orientation of the study was collection of data on what is happening in the realm of searching for information, particularly online searching. It was an exploratory study because very little data exist on the variables studied. We observed patterns. We did not study why the things we observed happened. In that regard, we can speculate along with everybody else. Our remarks here are not directed at such speculations, but they do attempt to iterate certain implications.

The model of information seeking, concentrating on the context of questions and problem orientation, worked well in that it showed an impact on relevance. The model needs sharpening no doubt, but even so, it provides several implications for design of information systems and for the practice of searching. Both have to consider giving users the chance to express the problem at hand at some length together with an opportunity for users to give their estimate of what information most likely exists on the problem. This information can then be incorporated in searching.

In this study, as in many other studies involving searchers and searching, one set of conclusions is negative. We uncovered more evidence of things which do not affect retrieval of relevant items or precision and recall than evidence of things which do. There is an absence of any clear influence of particular variables (be they user, question, searcher, or search related) on the relevance of retrieved items and even less of an indication of variables affecting recall and precision. What affects the retrieval of relevant items can be explained only to a certain and rather small degree. Thus, it is not surprising that searching is still more of an art than an algorithm and that providing intelligent search systems or modules and expert systems in broader subject areas has met with limited success. This also implies that education, training, and guidance of searchers (be they intermediary or end users) is of paramount importance. However, one has to look very carefully at the type of such education, training, and guidance.

One of the more interesting positive findings is this: items retrieved by searchers with a high score on the Remote Associates Test, which is highly dependent on idiomatic English language fluency (without regard to particular subject matter) are more likely to be relevant. Fluency in associations in English and in English idioms seem to be an important characteristic of more effective searchers. Surprisingly enough, searchers scoring higher on a test of symbolic reasoning (involving inequalities) performed poorer. If the results hold at large the implications are obvious.

Another important finding relates to cycling: items retrieved in searches with higher numbers of search cycles, (or in other words for searches in which the searcher displayed results more frequently), are more likely to be relevant. The implication is that feedback is very important. This supports system designs incorporating relevance feedback in the search process. Unfortunately, such system features while common in the laboratory have not as yet reached existing large public and commercial information systems and vendors.

The most important finding is the very large differences in search terms selected for searching and in items retrieved by different searchers searching the same question. Higher recall is achieved only when outputs from several searchers are merged. This implies that if a user desires a search of higher effectiveness he or she should parcel the search out to several searchers. Those items that are retrieved in common by several searchers have a much higher chance of being relevant. Implications for design of automated search procedures are obvious: multiple searching of a question from different "angles" provides a good way of assuring the retrieval of relevant items and for ranking them.

The data strongly suggest that the searcher is the 'weak link' in the retrieval of items from large files. Searchers may vary widely in their assessment of the meaning of a question and thus in their selection of search terms and in what they retrieve.

Finding large differences among searchers has implications in these areas:

1. Education, training, guidance. Questions should be raised about: the adequacy of searcher education; the appropriateness of a division of emphasis which stresses mechanics of searching and the technology and systems features over question analysis and search strategy; the nature of existing system search features and guidance features.

2. Research. There is a clear need for a better understanding of the nature of observed differences and for confirmation of the results. Without such an understanding, design of intelligent search systems and features becomes a guessing game based on speculation.

3. Design. Information systems need features that will minimize the differences in searching, such as help in question processing, automatic question transformation, focused human-system interfaces, and relevance guidance, feedback and estimates.

A significant amount of research on users, questions, searchers, and searching is still needed to lift searching from an art ot a science and to take the guesswork out of the process of designing human-system interfaces involving searching. To be successful, intelligent systems desired for the future are not possible without such research. We know a good deal less than we think.

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APPENDICES

EXPERIMENTS ON THE COGNITIVE ASPECTS OF INFORMATION SEEKING AND INFORMATION RETRIEVING

Final Report

for

National Science Foundation Grant IST-8505411

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APPENDICES

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INTROCUTION TO THE APPENDICES

These appendices are a companion to the final report of an NSF sponsored study concentrating on a characterization of the elements in information seeking and information retrieving, particularly in relation to the cognitive decisions and human interactions involved in online information retrieval. The objectives were to conduct a series of experiments related to the:

1. Context of questions as provided by the users
2. Structure and classification of questions
3. Cognitive traits and decision making of searchers
4. Comparative nature of the search by different searchers of the same question

One question was submitted by each of the 40 users participating in the project. The users also indicated the context and constraints on the question and were interviewed about the problem at hand. A group of 40 searchers was assembled. The searchers were tsted on three cognitive tests and provided data on their online experience. Each question was searched nine times for a total of 360 searches in the project. The merged or union set after elimination of duplicates for all nine searches for a question was sent to a user for evaluation of relevance and utility. For all 360 searches 8956 items were retrieved and evaluated, of these 5411 were unique. The analysis consisted of observing the frequency and distribution of 90 variables involved and a correlation for significance for all of the 90 variables that make sense to correlate.

A tremendous amount of 'raw' and analyzed data was generated in the project. The aim of the final report has been to present, in as much detail as possible, the data and results of the study. To this end the final report is produced in two parts. The first consists of a presentation of methods, results, and conclusions. This second part is composed of a set of appendices containing as much of the 'raw' data as we could reasonably reproduce. The rest of the data is deposited in machine-readable form with the complete project archives at two universities: Case Western Reserve University (contact Paul Kantor) and Rutgers, the State University of New Jersey (contact Tefko Saracevic).

The study produced a wealth of data that in itself is a considerable and even unique resource. Our idea is to exploit further this data and to provide open access to this data to all who desire to use it further, and, of course have resources to do so.

The first part of the report stands on its own. The appendices are an invitation for verification, refutation, replication, and further in-depth study.

APPENDIX A

USER QUESTIONS FOR ONLINE SEARCHES AND CONTEXT MEASURES FOR QUESTIONS Q001 TO Q040

APPENDIX A. USER QUESTIONS FOR ONLINE SEARCHES AND CONTEXT MEASURES FOR QUESTIONS Q001 TO Q040

For each of the 40 questions used in the project a copy of Form 15 (see Appendix H) was completed to include the following:

1. Question number assigned for the project (i.e., Q001 through Q040)
2. DIALOG database file used (including the DIALOG file number and the DIALOG file name)
3. Searcher code numbers for the five outside and four project searches (The project search codes are explained in detail in the first volume of this report, Table 9-1.)
4. Brief title transcribed as submitted by the user
5. Question statement transcribed as submitted by the user
6. Type of search requested by the user
7. Context scales (1. problem definition, 2. intent, 3. public knowledge, and 4. internal knowledge). The user completed all four context scales; the five outside searchers completed the public knowledge scale and the internal knowledge scale; and the project searcher completed all four scales. the first project search (first digit of the code, 1) was the only project search to examine the effects of context on the search.

Form 15 (3/31/86)

NSF PROJECT IST-850 5411
EXPERIMENTS ON THE COGNITIVE ASPECTS OF INFORMATION
SEEKING AND INFORMATION RETRIEVING

USER QUESTIONS FOR ONLINE SEARCHES

QUESTION NUMBER: 001
DIALOG DATABASE USED: 11 - PSYCHINFO
SEARCHER CODE NUMBERS: 013, 005, 002, 016, 021, 119, 219, 319, 419

A1. BRIEF TITLE:

The structure and function of interpersonal relationships.

A2. QUESTION STATEMENT:

Structure -
What salient variables comprise the relationship between middle aged children and their parents?
Function-
What are tthe communication processes which are enacted in these relationships?

TYPE OF SEARCH REQUESTED

B. A precise or a broad search: broad
C. Research application: Graduate study - Nursing
D. Retrieve articles in English only or any language: English, German
E. Years to be searched: No limits
F. DIALOG databases suggested: psychology, sociology, education, gerontology

CONTEXT SCALES

	Problem Definition	Intent	Public Knowledge	Internal Knowledge
User	1.0	4.0	3.0	4.0
Searcher				
002	-	-	3.0	2.0
005	-	-	5.0	4.0
013	-	-	5.0	2.0
016	-	-	4.0	2.0
021	-	-	5.0	4.0
119	1.0	1.0	5.0	1.0

Form 15 (3/31/86)

NSF PROJECT IST-850 5411
EXPERIMENTS ON THE COGNITIVE ASPECTS OF INFORMATION
SEEKING AND INFORMATION RETRIEVING

USER QUESTIONS FOR ONLINE SEARCHES

QUESTION NUMBER: 002
DIALOG DATABASE USED: 218 - NURSING AND ALLIED HEALTH
SEARCHER CODE NUMBERS: 033, 004, 003, 026, 006, 120, 220, 320, 420

A1. BRIEF TITLE:

Organization design variables in nursing department

A2. QUESTION STATEMENT:

Structures-

1. How are departments of nursing designed/structured/organized? (in the acute care setting)

2. Size, Purpose, and Environment
What "variables" (criterias, parameters) were used to design the department of nursing?

3. How are departments of nursing integrated into the general hospital?

4. What "models" of organization are used in nursing?

TYPE OF SEARCH REQUESTED

B. A precise or a broad search: Broad
C. Research application: Graduate study-Nursing; dissertation
D. Retrieve articles in English only or any language: English
E. Years to be searched: No limits
F. DIALOG databases suggested:

CONTEXT SCALES

	Problem Definition	Intent	Public Knowledge	Internal Knowledge
User	3.5	1.0	1.0	3.5
Searcher				
003	-	-	3.0	1.0
004	-	-	4.0	3.0
006	-	-	0.0	0.0
026	-	-	3.0	3.0
033	-	-	3.0	3.0
120	1.0	5.0	3.0	1.0

Form 15 (3/31/86)

NSF PROJECT IST-850 5411
EXPERIMENTS ON THE COGNITIVE ASPECTS OF INFORMATION
SEEKING AND INFORMATION RETRIEVING

USER QUESTIONS FOR ONLINE SEARCHES

QUESTION NUMBER: 003
DIALOG DATABASE USED: 64 - CHILD ABUSE & NEGLECT
SEARCHER CODE NUMBERS: 014, 033, 002, 016, 021, 118, 218, 318, 418

A1. BRIEF TITLE:

The use of stereotypes by health care providers in the diagnosis of child abuse

A2. QUESTION STATEMENT:

What typifications of clients are used by health care providers in the diagnosis and labeling of child abuse?

typifications: characteristics, stereotypes
health care providers: nurses and physicians

TYPE OF SEARCH REQUESTED

B. A precise or a broad search: Broad
C. Research application: Faculty research-Nursing
D. Retrieve articles in English only or any language: English
E. Years to be searched: 1975 to 1985
F. DIALOG databases suggested: Psych-Info, Soc.-Info, Child Abuse and Neglect

CONTEXT SCALES

	Problem Definition	Intent	Public Knowledge	Internal Knowledge
User	3.0	2.0	2.0	4.0
Searcher				
002	-	-	2.0	1.0
014	-	-	0.0	1.0
016	-	-	3.0	2.0
021	-	-	3.0	4.0
033	-	-	5.0	4.0
118	2.0	1.0	2.0	1.0

Form 15 (3/31/86)

NSF PROJECT IST-850 5411
EXPERIMENTS ON THE COGNITIVE ASPECTS OF INFORMATION
SEEKING AND INFORMATION RETRIEVING

USER QUESTIONS FOR ONLINE SEARCHES

QUESTION NUMBER: 004
DIALOG DATABASE USED: 154 - MEDLINE 1980-present
SEARCHER CODE NUMBERS: 010, 037, 009, 024, 028, 120, 220, 320, 420

A1. BRIEF TITLE:

Controlled lung hyperinflations, endotracheal suctioning, and cerebrovascular status in persons with severe closed head injuries

A2. QUESTION STATEMENT:

The aim of the research is to identify the effects of controlled hyperinflation breaths, delivered prior to and following endotracheal suctioning, upon the cerebrovascular status of adult subjects with severe closed head injuries. Specifically, two research questions have been generated.

1. What are the effects of controlled lung hyperinflation breaths delivered prior to and following endotracheal suctioning upon Mean Intracranial Pressure (MICP), Mean Arterial Blood Pressure (MABP), Cerebral Perfusion Pressure and Heart Rate in adults with severe closed head injuries?

2. What is the optimal lung volume delivered during controlled lung hyperinflations that will produce minimal changes in Mean Intracranial Pressure, Mean Arterial Blood Pressure, Cerebral Perfusion Pressure and Heart Rate in adults with severe closed head injuries?

TYPE OF SEARCH REQUESTED

B. A precise or a broad search: Broad
C. Research application: Graduate study-Nursing
D. Retrieve articles in English only or any language: English
E. Years to be searched: No limits
F. DIALOG databases suggested:

QUESTION NUMBER: 004 - PAGE 2

CONTEXT SCALES

	Problem Definition	Intent	Public Knowledge	Internal Knowledge
User	4.5	4.0	5.0	3.0
Searcher				
009	-	-	4.0	1.0
010	-	-	3.0	1.0
024	-	-	0.0	1.0
028	-	-	4.0	3.0
037	-	-	3.0	1.0
120	3.0	3.0	3.0	1.0

Form 15 (3/31/86)

NSF PROJECT IST-850 5411
EXPERIMENTS ON THE COGNITIVE ASPECTS OF INFORMATION SEEKING AND INFORMATION RETRIEVING

USER QUESTIONS FOR ONLINE SEARCHES

QUESTION NUMBER: 005
DIALOG DATABASE USED: 148 - TRADE AND INDUSTRY INDEX
SEARCHER CODE NUMBERS: 006, 013, 004, 003, 026, 120, 220, 320, 420

A1. BRIEF TITLE:

Rules of thumb in industry

A2. QUESTION STATEMENT:

Keywords: Rules-of-thumb; axiom; on-the-average (other possibilites: as a general rule; expert opinion)

Focus: I am looking for rules of thumb, industry by industry (at the 2-digit SIC level or can be more specific). These are rules or axioms which evolved over the years. They are generally known, not confidential.

Example: In the motel/hotel industry it is known that on the average you should fill 60% of your rooms or else you face financial problems. The same rule or axiom applies roughly to airline seats and to movie theatres.

Scope: All sectors include agriculture; construction; mining; manufacturing; all services (utilities, trade, professional, repair)

Notes:
1. I am open to use other keywords and also to non-business data bases.
2. I'd be able to use a search of Dissertation Abstracts for theses which focused on an industry (SIC 2-digit or more likely narrower), but this may be too costly or cumbersome.
3. A friend did do a search for me of PTS Prompt already, so I'd go with Trade and Industry first. PAIS may yield something; also Canadian Business, Industry Data Sources, Management Contents
4. I'd like to know if non-business information bases in Dialog contain business information.

TYPE OF SEARCH REQUESTED

B. A precise or a broad search: Broad
C. Research application: Faculty research
D. Retrieve articles in English only or any language: English
E. Years to be searched: Last 5 years
F. DIALOG databases suggested: Trade and Industry, Industry Data Sources, Management Contents

QUESTION NUMBER: 005 - PAGE 2

CONTEXT SCALES

	Problem Definition	Intent	Public Knowledge	Internal Knowledge
User	4.0	2.0	4.0	4.0
Searcher				
003	-	-	3.0	3.0
004	-	-	2.0	4.0
006	-	-	4.0	1.0
013	-	-	4.0	2.0
026	-	-	1.0	1.0
120	4.0	1.0	1.0	1.0

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QUESTION NUMBER: 006
DIALOG DATABASE USED: 6 - NTIS
SEARCHER CODE NUMBERS: 011, 040, 039, 038, 027, 120, 220, 320, 420

A1. BRIEF TITLE:

– Preventiooon of crystal growth on foreign surfaces

A2. QUESTION STATEMENT:

Carbon dioxide crystals are formed in a reactor. At high production rate solid growth on reactor interior surfaces became a major problem. We'd like to find out the cause of this problem and various methods that can be used to avoid solid growth on surfaces.

TYPE OF SEARCH REQUESTED

B. A precise or a broad search: Broad
C. Research application: Industrial
D. Retrieve articles in English only or any language: Any language
E. Years to be searched: No limits
F. DIALOG databases suggested:

CONTEXT SCALES

	Problem Definition	Intent	Public Knowledge	Internal Knowledge
User	4.0	5.0	2.0	2.0
Searcher				
011	-	-	4.0	1.0
027	-	-	0.0	1.0
038	-	-	3.0	1.0
039	-	-	3.0	1.0
040	-	-	3.0	1.0
120	2.0	5.0	2.0	1.0

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USER QUESTIONS FOR ONLINE SEARCHES

QUESTION NUMBER: 007
DIALOG DATABASE USED: 75 - MANAGEMENT CONTENTS
SEARCHER CODE NUMBERS: 026, 006, 014, 004, 003, 119, 219, 319, 419

A1. BRIEF TITLE:

Barriers to strategic human resource management

A2. QUESTION STATEMENT:

Employee commitment to an organization develops as a result of the interaction between the organization's treatment of employees (i.e. skills, performance, company policies regarding benefits, career opportunites), and the employees' contribution to the company (i.e. skills, performance, abilities). Generally, the belief is that the greater the employees' commitment to the organization, the greater their motivation to perform the task and projects required by the organization. To maximize employee commitment, and thereby maximize organizational performance, senior managers can no longer assume a short-term planning horizon toward employee issues. That is, they must no longer wait until a crisis arises to address issues regarding the organization's treatment of employees. Instead, senior managers must assume a long-term, strategic, planning perspective that enables them to not only attain business objectives but also enables them to enhance the development of employees in the organization.

At the present time, the majority of U.S. corporations react to human resource issues only when they reach crisis levels. Very few companies plan proactively to meet employee needs, and even fewer consider the need to enhance employee development along with attaining business objectives. This research examines the barriers to managing employees and planning for future human resource issues in a long-term, strategic manner. Specifically, this research addresses the question:

What factors impede the strategic management of human resources in today's organizations?

Possible determinants include:
*Status and role of the Human Resource Function in general, and the senior Human Resource executive in particular.
Role may be defined as the behaviors expected of the occupant (s) of the Human Resource function; this definition includes the expectations of Human

QUESTION NUMBER: 007 - PAGE 2

Resource's constituencies (senior management, employees) regarding which behaviors are appropriate, and the enactment or conduct of the Human Resource executive. STATUS may be defined as the position in the social system of the organization accorded the Human Resource staff and senior Human Resource executive, and includes the characteristics of esteem, power respect.
*Organizational Norms regarding proper modes of interaction between managers and employees. NORMS may be defined as the standards against which behavior is evaluated; a shared view of desirable behavior.
*Company Characteristics including: its age, employee number, long-term financial performance, labor requirements (labor intensity and skill mix), degree of decentralization, organization structure and design.

TYPE OF SEARCH REQUESTED

B. A precise or a broad search: Broad
C. Research application: Graduate study-management
D. Retrieve articles in English only or any language: Any language
E. Years to be searched: No limits
F. DIALOG databases suggested:

CONTEXT SCALES

	Problem Definition	Intent	Public Knowledge	Internal Knowledge
User	3.0	1.0	4.0	3.5
Searcher				
003	-	-	3.0	2.0
004	-	-	4.0	4.0
006	-	-	5.0	2.0
014	-	-	4.0	-
026	-	-	3.0	3.0
119	3.0	2.0	3.0	1.0

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QUESTION NUMBER: 008
DIALOG DATABASE USED: 154 - MEDLINE 1980-present
SEARCHER CODE NUMBERS: 028, 010, 037, 009, 024, 120, 220, 320, 420,

A1. BRIEF TITLE:

The effects of aerobic exercise on women who are menopausal

A2. QUESTION STATEMENT:

The study will address the effects of an aerobic interval training program on the health of middle-aged women who are menopausal. I will be looking at health in terms of physiological, psychological, and social parameters.

Menopausal women- women who are middle-aged (approx. 35-60);who are experiencing the cessation of menstrual periods; and who experience the cessation as a natural process of aging.

Aerobic interval training- physical exercise that is individually prescribed for each subject, attention is given to the rate, intensity, and duration of the exercise.

Physiological parameter- heart rate, blood pressure, maximum volume of oxygen, cardiac stress testing, (treadmill test)

Social Parameter- lifestyle, health care practices

TYPE OF SEARCH REQUESTED

B. A precise or a broad search: Not specified
C. Research application: Graduate study-Nursing
D. Retrieve articles in English only or any language: English
E. Years to be searched: No limits
F. DIALOG databases suggested: Medline, Psychinfo

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CONTEXT SCALES

	Problem Definition	Intent	Public Knowledge	Internal Knowledge
User	4.0	2.0	3.0	4.0
Searcher				
009	-	-	-	-
010	-	-	4.0	3.0
024	-	-	3.0	3.0
028	-	-	4.0	3.0
037	-	-	3.0	1.0
120	5.0	2.0	4.0	1.0

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USER QUESTIONS FOR ONLINE SEARCHES

QUESTION NUMBER: 009
DIALOG DATABASE USED: 37 - SOCIOLOGICAL ABSTRACTS
SEARCHER CODE NUMBERS: 021, 014, 033, 002, 016, 119, 219, 319, 419

A1. BRIEF TITLE:

Alternative human services delivery systems

A2. QUESTION STATEMENT:

The classical model of service delivery has been the individual client and the individual casework in a agency based office. The model is best exemplified by the Family Service Agencies. Beginning about 1960 variations and alternatives to this model have been developed. We are hoping thru a series of demonstration projects to design alternative models and test them. What I would like are abstracts describing alternative model which have been developed over the past 25 years.
An example would be the decentralization of the service into the black inner city church, rather than offering service at the agency. I could narrow the question to model which include the utilization of "natural" networks (black church) and rely more on community networks, natural or created by the social workers.

TYPE OF SEARCH REQUESTED

B. A precise or a broad search: Broad
C. Research application: Faculty research-applied social science
D. Retrieve articles in English only or any language: English
E. Years to be searched: 1960-present
F. DIALOG databases suggested:

CONTEXT SCALES

	Problem Definition	Intent	Public Knowledge	Internal Knowledge
User	2.0	2.0	4.0	3.0
Searcher				
002	-	-	2.0	1.0
014	-	-	4.0	2.0
016	-	-	4.0	2.0
021	-	-	3.0	2.0
033	-	-	3.0	1.0
119	2.0	2.0	2.0	1.0

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USER QUESTIONS FOR ONLINE SEARCHES

QUESTION NUMBER: 010
DIALOG DATABASE USED: 154 - MEDLINE 1980-present
SEARCHER CODE NUMBERS: 024, 028, 010, 037, 009, 120, 220, 320, 420

A1. BRIEF TITLE:

Motivation/choice in chemotherapy decision making

A2. QUESTION STATEMENT:

What motivates adults to choose to continue receiving chemotherapy or to choose not to continue to receive chemotherapy?

Motivation- hope, fear, despair, depression, self-esteem, self perception, self actualization, needs, goals drives, intrinsic motivation, extrinsic motivation, motivation, perceived life threat, internal anxiety, values, self interest.
Choice- conflict, choice behavior, perception, self perception, subjective factors, decision making choice.
Chemotherapy- cancer, neoplasm, tumor, drug therapy.
Adults- patients, clients, persons, individuals

TYPE OF SEARCH REQUESTED

B. A precise or a broad search: Broad
C. Research application: Graduate study-Nursing
D. Retrieve articles in English only or any language: English
E. Years to be searched: No limits
F. DIALOG databases suggested:

CONTEXT SCALES

	Problem Definition	Intent	Public Knowledge	Internal Knowledge
User	4.0	2.0	4.0	4.5
Searcher				
009	-	-	5.0	1.0
010	-	-	5.0	4.0
024	-	-	5.0	4.0
028	-	-	3.0	2.0
037	-	-	2.0	2.0
120	5.0	3.0	2.0	2.0

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QUESTION NUMBER: 011
DIALOG DATABASE USED: 154 - MEDLINE 1980-present
SEARCHER CODE NUMBERS: 009, 024, 028, 010, 037, 119, 219, 319, 419

A1. BRIEF TITLE:

Family response to sudden infant death syndrome

A2. QUESTION STATEMENT:

What are the psycho-emotional and psycho-social responses of parents and surviving siblings to the death of an infant due to Sudden Infant Death Syndrome (SIDS; also called "crib death"); and what are the coping strategies of these family members?

TYPE OF SEARCH REQUESTED

B. A precise or a broad search: Broad
C. Research application: Faculty research-Nursing
D. Retrieve articles in English only or any language: Any language
E. Years to be searched: 1960-present
F. DIALOG databases suggested:

CONTEXT SCALES

	Problem Definition	Intent	Public Knowledge	Internal Knowledge
User	3.0	2.0	4.0	4.0
Searcher				
009	-	-	5.0	2.0
010	-	-	5.0	4.0
024	-	-	5.0	4.0
028	-	-	3.0	1.0
037	-	-	4.0	3.0
119	4.0	1.0	3.0	1.0

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QUESTION NUMBER: 012
DIALOG DATABASE USED: 13 - INSPEC 1977-present
SEARCHER CODE NUMBERS: 005, 029, 027, 011, 040, 119, 219, 319, 419

A1. BRIEF TITLE:

Chemistry of Silicon Nitride and Silicon Carbide

A2. QUESTION STATEMENT:

I would like to find out what is known about the chemical reactivity of Silicoon

Carbide and Silicon Nitride ceramic powders at low temperatures (room temperature)-especially in aqueous environments-both liquid water and water vapor. I want to know what the surface chemistry of these materials is (what surface groups are present and how they interact with the environment) and the physical chemistry (colloidal behavior) of ultrafine ceramic powders made from these powders. Important studies would include surface titration (also called titration of surface groups or potentiometric). zeta potential (determination of surface potential), flocculation and/or sedimentation behavior, viscosity (viscometry) adsorption, FTIR (Fourier Transform Infrared) or traditional IR (infrared) spectroscopy, XPS/ESCA/AUGER Spectroscopies. Also important would be studies characterizing the reaction rate of bulk Silicon Carbide and Silicon Nitride with water-for instance studies determining the reaction rate (kinetics) or decomposition products at room temperature.

TYPE OF SEARCH REQUESTED

B. A precise or a broad search: Broad
C. Research application: Graduate study-Chemical engineering
D. Retrieve articles in English only or any language: Any language-if abstract in English
E. Years to be searched: No limits
F. DIALOG databases suggested: Electronics/semiconductor, Chemistry, Materials (science), Ceramics, Physical sciences, Physics

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CONTEXT SCALES

	Problem Definition	Intent	Public Knowledge	Internal Knowledge
User	3.0	3.0	5.0	4.0
Searcher				
005	-	-	2.0	1.0
011	-	-	5.0	3.0
027	-	-	1.0	1.0
029	-	-	2.0	2.0
040	-	-	3.0	1.0
119	4.0	5.0	0.0	1.0

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QUESTION NUMBER: 013
DIALOG DATABASE USED: 15 - ABI/INFORM
SEARCHER CODE NUMBERS: 003, 026, 006, 013, 004, 120, 220, 320, 420

A1. BRIEF TITLE:

The effectiveness of non-profit human service organization

A2. QUESTION STATEMENT:

How has the concept "effectiveness" been defined and measured in studies of non-profit human service organizations.
In resssearch on for-profit businesses, it has been defined in terms of a) goal-attainment, b) obtaining necessary resources for survival and growth, c) satisfactory internal, balances, exchanges, integration, d) and satisfaction of constituencies. Non-profit differ in numerous ways in these aspects from from for-profit organizations.
Are these approaches transferable? Are there alternatives?

TYPE OF SEARCH REQUESTED

B. A precise or a broad search: Broad
C. Research application: Faculty research-applied social science
D. Retrieve articles in English only or any language: English
E. Years to be searched: No limits
F. DIALOG databases suggested:

CONTEXT SCALES

	Problem Definition	Intent	Public Knowledge	Internal Knowledge
User	4.0	2.5	2.0	4.0
Searcher				
003	-	-	3.0	1.0
004	-	-	3.0	4.0
006	-	-	3.0	2.0
013	-	-	3.0	4.0
026	-	-	3.0	3.0
120	2.0	1.0	4.0	3.0

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QUESTION NUMBER: 014
DIALOG DATABASE USED: 151 - HEALTH PLANNING AND ADMINISTRATION
SEARCHER CODE NUMBERS: 004, 003, 026, 006, 033, 120, 220, 320, 420

A1. BRIEF TITLE:

Prospective payment system-related changes in hospital information systems and information systems groups

A2. QUESTION STATEMENT:

The advent of prospective payment systems for American health care organizations (including diagnosis-related groups ("DRGs")) is expected to have caused many changes in American hospitals' use of an information systems group/function. One expects the increased design and development of improved management information systems that will help hospital decisions makers manage in the new payment enviroment. These computer-based information systems would assist the hospital in product and service costing (micro-costing), as well as better integration of patient care information with financial (charge) information. One also expects changes in the position, role and reward structure of the hospital information systems group. As management information systems become more central to the survival of the hospital, one would expect the hospital's data processing group to become larger, better paid, and more powerful. They are also expected to be more closely linked with top hospital decision makers.

Terms:
Prospective payment/DRG: systems used by Medicare, some Medicaid and other third party payors to set the price for patient care (in patient) before service is rendered to the patient.
Management information system/computer-based information system/information system: the collection of hardware, software and procedure used to collect, store, and report information used in task and decision support.
Information systems group/MIS group/data processing: the individuals who develop, acquire, manage information systems for an organization.
Micro-costing: The activity of examining, in detail, how many resources are consumed in producing a unit of a product or service.
Diagnosis-related-group (DRG): a particular prospective payment method, in which a set payment is made for all cases of a given disease or health problem. Amounts a hospital would be paid for the patient would depend on what DRG the patients case is classified as.

QUESTION NUMBER: 014 - PAGE 2

TYPE OF SEARCH REQUESTED

B. A precise or a broad search: Broad
C. Research application: Graduate study-Management
D. Retrieve articles in English only or any language: English
E. Years to be searched: No limits
F. DIALOG databases suggested:

CONTEXT SCALES

	Problem Definition	Intent	Public Knowledge	Internal Knowledge
User	2.0	1.0	3.0	4.0
Searcher				
003	-	-	4.0	2.0
004	-	-	5.0	3.0
006	-	-	5.0	2.0
026	-	-	3.0	3.0
033	-	-	5.0	5.0
120	1.0	4.0	1.0	1.0

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QUESTION NUMBER: 015
DIALOG DATABASE USED: 154 - MEDLINE 1980-present
SEARCHER CODE NUMBERS: 037, 009, 024, 028, 010, 120, 220, 320, 420

A1. BRIEF TITLE:

Retrolental Fibroplasia

A2. QUESTION STATEMENT:

Retrolental fibroplasia is a disease of the eye which began appearing in premature babies in the mid. to late 1940's. Because of excessive oxygen in the incubators, these babies were permanently blinded. The cause of this disease was isolated in the early 1950's.

I am interested in the occurrences, causes, treatment, and prevention of Retrolental Fibroplasia from 1945 to 1985.

TYPE OF SEARCH REQUESTED

B. A precise or a broad search: Broad
C. Research application: General
D. Retrieve articles in English only or any language: English
E. Years to be searched: 1945-1985
F. DIALOG databases suggested:

CONTEXT SCALES

	Problem Definition	Intent	Public Knowledge	Internal Knowledge
User	5.0	4.0	4.0	3.0
Searcher				
009	-	-	5.0	1.0
010	-	-	5.0	1.0
024	-	-	5.0	5.0
028	-	-	5.0	2.0
037	-	-	5.0	1.0
120	4.0	2.0	4.0	1.0

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QUESTION NUMBER: 016
DIALOG DATABASE USED: 11 - PSYCINFO
SEARCHER CODE NUMBERS: 016, 021, 013, 005, 002, 120, 220, 320, 420

A1. BRIEF TITLE:

Prediction of type of activity during retirement

A2. QUESTION STATEMENT:

The question here concerns 1) what kinds of activities people engage in during retirement and 2) what charactistics and background factors prior to retirement indicate the retirement activity patterns. The notion here is that eventually such information would be useful in pre-retirement counseling.
I am most interested in what people do in retirement, although it would probably be relevant to consider how they feel about what they do but not how they feel about retirement in general.

TYPE OF SEARCH REQUESTED

B. A precise or a broad search: Broad
C. Research application: Faculty research-Psychology
D. Retrieve articles in English only or any language: English
E. Years to be searched: No limits
F. DIALOG databases suggested:

CONTEXT SCALES

	Problem Definition	Intent	Public Knowledge	Internal Knowledge
User	2.0	4.5	4.0	3.0
Searcher				
002	-	-	4.0	2.0
005	-	-	4.0	1.0
013	-	-	3.0	2.0
016	-	-	4.0	2.0
021	-	-	3.0	3.0
120	1.0	5.0	3.0	2.0

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QUESTION NUMBER: 017
DIALOG DATABASE USED: 5 - BIOSIS PREVIEWS 1981-present
SEARCHER CODE NUMBERS: 040, 039, 038, 027, 011, 119, 219, 319, 419

A1. BRIEF TITLE:

Drug delivery devices and systems

A2. QUESTION STATEMENT:

I want to determine what types of pumps and control systems are being used for delivering therapeutic agents (drugs) in animal experiments and clinical applications.
Topic of interst: principles of specification of pumps; open-loop vs. closed-loop control of these devices; clinical user experience.

TYPE OF SEARCH REQUESTED

B. A precise or a broad search: Broad-but only less than 200 abstracts
C. Research application: Faculty research-Biomedical engineering
D. Retrieve articles in English only or any language: Any language
E. Years to be searched: Last five years
F. DIALOG databases suggested:

CONTEXT SCALES

	Problem Definition	Intent	Public Knowledge	Internal Knowledge
User	5.0	4.0	5.0	3.0
Searcher				
011	-	-	5.0	2.0
027	-	-	0.0	1.0
038	-	-	5.0	1.0
039	-	-	3.0	1.0
040	-	-	4.0	1.0
119	5.0	4.0	1.0	1.0

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QUESTION NUMBER: 018
DIALOG DATABASE USED: 15 - ABI/INFORM
SEARCHER CODE NUMBERS: 004, 003, 026, 006, 014, 119, 219, 319, 419

A1. BRIEF TITLE:

Competencies (skills, abilities) needed in the managerial role

A2. QUESTION STATEMENT:

Question: What are the key competencies that a manager needs to perform well in a managerial role, in general. (From these, we will later apply these general managerial competencies to the role of the physician-manager-that is, physicians who manage other physicians).

TYPE OF SEARCH REQUESTED

B. A precise or a broad search: Broad
C. Research application: Graduate study-Organizational behavior- Will be used in dissertation and dissertation results will be used by school of management to create 1)a new program for physician managers 2)and for the creation of a model of managerial competencies to be used with other groups as well.
D. Retrieve articles in English only or any language: English
E. Years to be searched: No limits
F. DIALOG databases suggested: Maybe-Management contents

CONTEXT SCALES

	Problem Definition	Intent	Public Knowledge	Internal Knowledge
User	4.0	1.0	4.0	3.0
Searcher				
003	-	-	3.0	1.0
004	-	-	4.0	4.0
006	-	-	5.0	2.0
014	-	-	5.0	4.0
026	-	-	3.0	3.0
119	5.0	1.0	1.0	2.0

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USER QUESTIONS FOR ONLINE SEARCHES

QUESTION NUMBER: 019
DIALOG DATABASE USED: 75 - MANAGEMENT CONTENTS
SEARCHER CODE NUMBERS: 001, 013, 005, 017, 008, 119, 219, 319, 419

A1. BRIEF TITLE:

Have the IIA standards had an impact on internal auditing.

A2. QUESTION STATEMENT:

We are interested in the perceived impact of the standards for internal auditing published by The Institute of Internal Auditors in 1977. These are voluntary professional standards which effect the scope of work, organization, education, and independence of practicing internal auditors. Any comparison of these internal audit standards to standards in other business professions would also be helpful. Articles, cases, books, dissertations, etc. that relate problems and successes in implementing these standards of internal audit in specific companies would also be helpful.

TYPE OF SEARCH REQUESTED

B. A precise or a broad search: Broad
C. Research application: Faculty research-Accounting
D. Retrieve articles in English only or any language: English
E. Years to be searched: 1977-1986
F. DIALOG databases suggested:

CONTEXT SCALES

	Problem Definiton	Intent	Public Knowledge	Internal Knowledge
User	3.0	3.0	3.0	5.0
Searcher				
001	-	-	5.0	4.0
005	-	-	5.0	1.0
008	-	-	0.0	0.0
013	-	-	4.0	2.0
017	-	-	4.0	1.0
119	3.0	1.0	1.0	2.0

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QUESTION NUMBER: 020
DIALOG DATABASE USED: 15 - ABI/INFORM
SEARCHER CODE NUMBERS: 032, 005, 001, 017, 013, 119, 219, 319, 419

A1. BRIEF TITLE:

Financial statement presentation

A2. QUESTION STATEMENT:

What literature and research exists regarding the presentation of financial statements and their effect on users of them? Of particular interest is disclosure requirement form of the SEC.

TYPE OF SEARCH REQUESTED

B. A precise or a broad search: Broad
C. Research application: Graduate study-accounting
D. Retrieve articles in English only or any language: English
E. Years to be searched: No limits
F. DIALOG databases suggested:

CONTEXT SCALES

	Problem Definition	Intent	Public Knowledge	Internal Knowledge
User	3.0	4.0	4.0	3.0
Searcher				
001	-	-	4.0	4.0
005	-	-	3.0	2.0
013	-	-	4.0	2.0
017	-	-	3.0	1.0
032	-	-	4.0	3.0
119	3.0	4.0	2.0	2.0

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QUESTION NUMBER: 021
DIALOG DATABASE USED: 37 - SOCIOLOGICAL ABSTRACTS
SEARCHER CODE NUMBERS: 021, 002, 016, 014, 033, 120, 220, 320, 420

A1. BRIEF TITLE:

Social supports of never married and/or child-free older women

A2. QUESTION STATEMENT:

What social support arrangements and networks are available to never married older women? What measures and definitions of adequacy of social support arrangements have been used? Does the physical and/or mental health of never married or child-free older people differ from married old parents?

TYPE OF SEARCH REQUESTED

B. A precise or a broad search: Broad
C. Research application: Faculty research-Applied Social Science
D. Retrieve articles in English only or any language: English
E. Years to be searched: 1965 to 1985
F. DIALOG databases suggested:

CONTEXT SCALES

	Problem Definition	Intent	Public Knowledge	Internal Knowledge
User	5.0	3.0	2.0	4.0
Searcher				
002	-	-	4.0	2.0
014	-	-	4.0	2.0
016	-	-	2.0	2.0
021	-	-	5.0	3.0
033	-	-	3.0	1.0
120	4.0	4.0	3.0	2.0

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QUESTION NUMBER: 022
DIALOG DATABASE USED: 108 - AEROSPACE DATABASE
SEARCHER CODE NUMBERS: 038, 027, 032, 008, 039, 119, 219, 319, 419

A1. BRIEF TITLE:

Space commercialization market forecast to year 2000

A2. QUESTION STATEMENT:

The economic colonization of space, spurred by the prospect of developing new and high purity semiconductors and pharmaceuticals in a gravity free environment, could produce $50 billion in commercial revenues by the year 2000. The space marketplace is divided into six major segments: materials processing, space communications, remote sensing, on-orbit services, ground support sevices, and commercial launch services. In addition space markets face several constraints and incentives including space law, Congressional and federal laws, NASA policy, Strategic Defense Initiative, foreign space competition, and financial climate factors.

The space shuttle has helped pave the way. Experiments have successfully run on the European-built spacelab. The U.S. space station, to be launched in the 1990's, will incorporate a modified Skylab for long-term use. This permanent orbiting presence will mark the crossover point away from R&D dominated by a few individual companies to large-scale industrial participation in space commercialization.

Beyond the turn of the century, space industrialization will turn to large-scale space structures to further the economic beachhead established in low-earth orbit. The projects will include L-5 orbit space habitats, geostationary orbiting solar power satellites, lunar-based space manufacturing facilities, mass driver or electromagnetic accelerator space transport systems, and space fabrication from non-terrestrial materials.

TYPE OF SEARCH REQUESTED

B. A precise or a broad search: Broad
C. Research application: Space conference program agenda
D. Retrieve articles in English only or any language: English
E. Years to be searched: no limits
F. DIALOG databases suggested:

QUESTION NUMBER: 022 - PAGE 2

CONTEXT SCALES

	Problem Definition	Intent	Public Knowledge	Internal Knowledge
User	5.0	5.0	3.0	5.0
Searcher				
008	-	-	0.0	0.0
027	-	-	0.0	1.0
032	-	-	5.0	2.0
038	-	-	5.0	3.0
039	-	-	5.0	4.0
119	1.0	4.0	5.0	2.0

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QUESTION NUMBER: 023
DIALOG DATABASE USED: 32 - METADEX
SEARCHER CODE NUMBERS: 015, 034, 035, 041, 030, 119, 219, 319, 419

A1. BRIEF TITLE:

Infiltration of sintered powder metals parts

A2. QUESTION STATEMENT:

Locate all references to sintered powder metals or powder metal parts infiltrated with copper or bronze.

TYPE OF SEARCH REQUESTED

B. A precise or a broad search: Broad
C. Research application: Industrial
D. Retrieve articles in English only or any language: English
E. Years to be searched: 1970 to 1986
F. DIALOG databases suggested: METADEX -32

CONTEXT SCALES

	Problem Definition	Intent	Public Knowledge	Internal Knowledge
User	3.0	3.0	5.0	2.0
Searcher				
015	-	-	4.0	2.0
030	-	-	0.0	1.0
034	-	-	5.0	1.0
035	-	-	0.0	0.0
041	-	-	5.0	4.0
119	2.0	5.0	0.0	1.0

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QUESTION NUMBER: 024
DIALOG DATABASE USED: 191 - RILA
SEARCHER CODE NUMBERS: 007, 012, 023, 025, 036, 120, 220, 320, 420

A1. BRIEF TITLE:

The cat in sixteenth century Italian art

A2. QUESTION STATEMENT:

What is the meaning of the cat as it appears in paintings in Italy from 1450 to 1600? When does it first appear in this context? Cats (usually one) frequently appear in Italian Renaissance paintings of the Nativity and of the Madonna and Child. Why? Is the cat a symbol of the Vigin or of the Christ Child? Is its symbolism positive or does it have an evil connotation? Is the cat male or female? Who is the first to use the cat in these contexts? Does the cat have the same meaning when included in paintings of saints or of the Last Supper?

TYPE OF SEARCH REQUESTED

B. A precise or a broad search: Not Specified
C. Research application: Faculty research - Art
D. Retrieve articles in English only or any language: Any language
E. Years to be searched: No limits
F. DIALOG databases suggested:

CONTEXT SCALES

	Problem Definition	Intent	Public Knowledge	Internal Knowledge
User	5.0	5.0	2.0	3.0
Searcher				
007	-	-	0.0	1.0
012	-	-	2.0	3.0
023	-	-	2.0	1.0
025	-	-	1.0	1.0
036	-	-	4.0	1.0
120	5.0	2.0	4.0	1.0

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QUESTION NUMBER: 025
DIALOG DATABASE USED: 1 - ERIC
SEARCHER CODE NUMBERS: 002, 033, 016, 021, 014, 119, 219, 319, 419

A1. BRIEF TITLE:

Relationship of oral and written communication

A2. QUESTION STATEMENT:

What relationship is there between the oral and written language of basic writerss (composition students)?

What evidence is there that speech (oral communication) instruction combined with writing (composition) instruction enhances the quality of student writing?

Possible search words: Writing, Speaking, Composition, College Composition, Freshman Composition, Basic Writers, Oral Communication, Speech Communication, Written Communication

TYPE OF SEARCH REQUESTED

B. A precise or a broad search: Broad
C. Research application: Graduate study - English
D. Retrieve articles in English only or any language: Any language
E. Years to be searched: No limits
F. DIALOG databases suggested:

CONTEXT SCALES

	Problem Definiton	Intent	Public Knowledge	Internal Knowledge
User	2.0	1.0	5.0	5.0
Searcher				
002	-	-	3.0	1.0
014	-	-	4.0	3.0
016	-	-	3.0	2.0
021	-	-	3.0	3.0
033	-	-	4.0	1.0
119	2.0	2.0	1.0	1.0

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QUESTION NUMBER: 026
DIALOG DATABASE USED: 38 - AMERICA: HISTORY & LIFE
SEARCHER CODE NUMBERS: 012, 023, 025, 036, 015, 119, 219, 319, 419

A1. BRIEF TITLE:

Workers' compensation in Ohio and Ontario

A2. QUESTION STATEMENT:

What was the interaction between the "law" and "lawyers" on the one hand and the policy of creating an administrative agency for purposes of compensating industrial workers injured or killed in accidents in Ohio and Ontario in the years from 1915 to 1935? Both Ohio and Ontario created workers' compensation schemes that were effective by 1915. In Ontario the Workers Compensation Board and in Ohio the Industrial Commission were intended to operate as an alternative to judicial determination of liability in tort (common law) litigation -- the previous existing method of compensation. Ontario successfully ridded its process of lawyers and courts: personal injury cases were determined on a no-fault basis from a compulsory compensation fund gathered by assessments on industries. Ohio legislated a similar scheme, but allowed appeals from the Industrial Commission findings and left room for lawyers to represent clients before the Commission. I am interested in legislative debates concerning this topic, in laws enacted, in laws applied by courts, in bar associations or other lawyers' groups impressions of changing circumstances, in medical concern about examinations of injured and dead workmen, in manufacturers' associations and labor unions' ideas and reactions, in reports and other materials produced by the compensation agencies, and in social scientists and legal scholars' comments on the issues.

TYPE OF SEARCH REQUESTED

B. A precise or a broad search: Broad
C. Research application: Faculty research - History
D. Retrieve articles in English only or any language: English
E. Years to be searched: No limits
F. DIALOG databases suggested:

QUESTION NUMBER: 026 - PAGE 2

CONTEXT SCALES

	Problem Definition	Intent	Public Knowledge	Internal Knowledge
User	4.0	3.0	5.0	4.0
Searcher				
012	-	-	3.0	2.0
015	-	-	0.0	1.0
023	-	-	2.0	1.0
025	-	-	3.0	2.0
036	-	-	0.0	0.0
119	5.0	3.0	4.0	1.0

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QUESTION NUMBER: 027
DIALOG DATABASE USED: 13 - INSPEC 1977-present
SEARCHER CODE NUMBERS: 027, 011, 040, 005, 025, 120, 220, 320, 420

A1. BRIEF TITLE:

High pressure transducer (or sensors)

A2. QUESTION STATEMENT:

Want to know what principles have been used for high pressure (greater than 2000 psi) sensors. What results obtained? What are the major problems for designing a Miniature High Pressure Sensor?

TYPE OF SEARCH REQUESTED

B. A precise or a broad search: Broad
C. Research application: Faculty - Electrical Engineering and Applied Physics
D. Retrieve articles in English only or any language: Any language
E. Years to be searched: No limits
F. DIALOG databases suggested:

CONTEXT SCALES

	Problem Definition	Intent	Public Knowledge	Internal Knowledge
User	5.0	2.0	5.0	3.0
Searcher				
005	-	-	5.0	1.0
011	-	-	0.0	1.0
025	-	-	4.0	2.0
027	-	-	0.0	1.0
040	-	-	0.0	0.0
120	3.0	5.0	2.0	1.0

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QUESTION NUMBER: 028
DIALOG DATABASE USED: 38 - AMERICA: HISTORY & LIFE
SEARCHER CODE NUMBERS: 036, 007, 012, 023, 034, 119, 219, 319, 419

A1. BRIEF TITLE:

History of University Circle in Cleveland

A2. QUESTION STATEMENT:

I am studying the history of University Circle in Cleveland, 1800 - 1985. I am focusing on three themes: philanthropy, city planning, and public vs. private development of the land and institutions. To highlight these themes the resulting book will consider periods of conflict regarding each of these themes.

TYPE OF SEARCH REQUESTED

B. A precise or a broad search: Broad
C. Research application: Faculty research - Interdisciplinary
D. Retrieve articles in English only or any language: Any language
E. Years to be searched: No limits
F. DIALOG databases suggested:

CONTEXT SCALES

	Problem Definition	Intent	Public Knowledge	Internal Knowledge
User	4.0	3.0	2.0	3.0
Searcher				
007	-	-	1.0	3.0
012	-	-	3.0	3.0
023	-	-	1.0	1.0
034	-	-	2.0	1.0
036	-	-	4.0	2.0
119	4.0	3.0	2.0	1.0

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QUESTION NUMBER: 029
DIALOG DATABASE USED: 8 - COMPENDEX
SEARCHER CODE NUMBERS: 040, 039, 038, 027, 011, 120, 220, 320, 420

A1. BRIEF TITLE:

Microwave firing of ceramics

A2. QUESTION STATEMENT:

MICROWAVE APPLICATIONS TO CERAMIC FIRING/SINTERING
The question is concerned with the microwave firing or sintering of the following ceramic materials: alpha-alumina or just plain alumina, barium ferrite, silicon nitride, boron nitride, titanium nitride, titanium carbide, silicon carbide, titanium boride, and molybedum silicide.

Because these compounds are so specific the question has been generalized to: Has anyone reported data on the firing or sintering of (any) ceramic material using microwave radiation?

I am unsure of the correct key words for the above search but have already found several relevant articles in the literature. I am searching for additional material specifically on the microwave properties of the ceramic materials. The articles I have already found are listed below in the hope that they might help qualify the key words one should be using to search for similar articles or reports.

Definitions:
firing - to heat a ceramic gel so that it hardens into a hard material

sintering - to mix a ceramic with another material. The resulting mix is heated until the composite material hardens.

microwave radiation - any electromagnetic radiation between 500 MHz and 10 GHz.

QUESTION NUMBER: 029 - PAGE 2

REFERENCE ARTICLES ALREADY FOUND

D. Johnson and R. Rizzo, "Plasma Sintering of Beta-Alumina", Ceramic Bulletin, Vol. 59, No. 4, 1980, p. 467-472.

E. Kemer and D. Johnson, "Microwave Plasma Sintering of Alumina", Ceramic Bulletin, Vol. 64, No. 8, 1985, p. 1132-1136.

M. Krage, "Microwave Sintering of Ferrites", Ceramic Bulletin, Vol. 60, No. 11, 1981, p. 1232-1234.

J. MacDowell, "Microwave Heating of Nepheline Glass-Ceramics", Ceramic Bulletin, Vol. 63, No. 2, 1984, p. 282-286.

L. Quenmeneur, J. Choisnet, and B. Raveau, "Microwave Clinkering with a Grooved Resonator Applicator", J. American Ceramic Society, Vol. 66, No. 12, p. 855-859.

R. Roy, S. Komarneni, and L. Yang, "Controlled Microwave Heating and Melting of Gels", J. American Ceramic Society, Vol. 68, No. 7, p. 392-395.

TYPE OF SEARCH REQUESTED

B. A precise or a broad search: Broad
C. Research application: Industrial
D. Retrieve articles in English only or any language: Any language
E. Years to be searched: No limits
F. DIALOG databases suggested:

CONTEXT SCALES

	Problem Definition	Intent	Public Knowledge	Internal Knowledge
User	3.8	5.0	3.0	2.0
Searcher				
011	-	-	5.0	2.0
027	-	-	3.0	1.0
038	-	-	4.0	1.0
039	-	-	4.0	1.0
040	-	-	3.0	2.0
120	3.0	3.0	4.0	2.0

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QUESTION NUMBER: 030
DIALOG DATABASE USED: 71 - MLA BIBLIOGRAPHY
SEARCHER CODE NUMBERS: 025, 036, 007, 012, 023, 120, 220, 320, 420

A1. BRIEF TITLE:

Creative evasion of censorship in South Africa

A2. QUESTION STATEMENT:

By what devices and techniques do South African artists, writers, journalists and academics, editors and publishers seek to maximize freedom of political expression (either within or beyond the law)? Presently in South Africa there is a great deal of ferment over the matter of censorship of political materials and artistic expression with political content. Materials once banned are being unbanned. Matter which in recent earlier times would have been swiftly muffled, manages to survive. How? Why? In this dynamic context there is a tendency toward hit and miss publication and prosecution. It is a situation that encourages creative evasion.

There is a great deal published on South Africa's press, but the focus is on state control and censorship. It concentrates on legal issues. I prefer to examine the less formal practices of testing the realm of the acceptable, and perhaps, the non-prosecutable. Thus I shall look at self-censorship, "surrogate censorship", professional self-regulation, and creative evasions of state control.

For case study data I shall focus on a number of specific issues - The banning and unbanning of a novel, a newspaper editor who prints, probably illegally, the remarks of a banned person, a playwright who uses satire to criticize the regime, etc. Most of my data will come from interviews and an examination of primary materials. But I do need some theoretical background. What, if anything, has been said about these sorts of questions in other English-speaking countries?

QUESTION NUMBER: 030 - PAGE 2

TYPE OF SEARCH REQUESTED

B. A precise or a broad search: Broad
C. Research application: Faculty research - Political Science
D. Retrieve articles in English only or any language: English
E. Years to be searched: 1970 - present
F. DIALOG databases suggested:

CONTEXT SCALES

	Problem Definition	Intent	Public Knowledge	Internal Knowledge
User	2.0	2.0	5.0	2.0
Searcher				
007	-	-	3.0	3.0
012	-	-	4.0	3.0
023	-	-	2.0	1.0
025	-	-	3.0	1.0
036	-	-	3.0	2.0
120	4.0	4.0	4.0	2.0

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QUESTION NUMBER: 031
DIALOG DATABASE USED: 61 - LISA
SEARCHER CODE NUMBERS: 023, 025, 036, 007, 012, 120, 220, 320, 420

A1. BRIEF TITLE:

Budgeting for law libraries

A2. QUESTION STATEMENT:

What are the principles for determining budgets? What role should acquisitions librarians play? What statistics are useful in compiling/projecting budgets? How should acquisitions departments monitor budgets? Should/how should one automate an acquisitions budget?

TYPE OF SEARCH REQUESTED

B. A precise or a broad search: Broad
C. Research application: Publication
D. Retrieve articles in English only or any language: Any language
E. Years to be searched: No limits
F. DIALOG databases suggested:

CONTEXT SCALES

	Problem Definition	Intent	Public Knowledge	Internal Knowledge
User	4.0	5.0	2.0	3.0
Searcher				
007	-	-	4.0	4.0
012	-	-	4.0	4.0
023	-	-	4.0	2.0
025	-	-	3.0	2.0
036	-	-	5.0	4.0
120	4.0	5.0	5.0	5.0

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QUESTION NUMBER: 032
DIALOG DATABASE USED: 8 - COMPENDEX
SEARCHER CODE NUMBERS: 029, 032, 001, 008, 017, 119, 219, 319, 419

A1. BRIEF TITLE:

Fly ash as a construction material in civil engineering

A2. QUESTION STATEMENT:

The main purpose of this search will be to obtain a comprehensive listing of literature on the engineering properties and various utilizations of fly ash and conditioned fly ash using cement or lime. Major uses for fly ash and fly ash admixtures that are of particular interest include: 1) load -bearing fills, 2) structural backfills, 3) soil modifiers, and 4) grouting fillers. The literature review will focus on the following items:

1) factors affecting utilization
2) factors affecting selection
3) design criteria
4) testing procedures
5) evaluation technique
6) construction procedure
7) quality controls
8) case histories

In summary, the search should document research results and construction experience of lime and cement stabilized fly ash, fly ash-soil mixture, and natural fly ash. It will provide a comprehensive review of physiochemical properties of fly ash and its various conditioned admixtures. Major engineering properties including the compaction characteristics, stress - strain - strength - time relationship, compressibility, permeability, capillary action, frost susceptibility, erodibility, and leaching will also be covered in the search.

TYPE OF SEARCH REQUESTED

B. A precise or a broad search: Broad
C. Research application: Faculty research - Civil Engineering
D. Retrieve articles in English only or any language: English
E. Years to be searched: No limits
F. DIALOG databases suggested:

QUESTION NUMBER: 032 - PAGE 2

CONTEXT SCALES

	Problem Definition	Intent	Public Knowledge	Internal Knowledge
User	5.0	2.0	5.0	4.0
Searcher				
001	-	-	5.0	1.0
008	-	-	0.0	0.0
017	-	-	4.0	1.0
029	-	-	5.0	4.0
032	-	-	5.0	2.0
119	5.0	1.0	0.0	1.0

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QUESTION NUMBER: 033
DIALOG DATABASE USED: 8 - COMPENDEX
SEARCHER CODE NUMBERS: 008, 001, 017, 029, 032, 119, 219, 319, 419

A1. BRIEF TITLE:

Slurry-flow friction factors derived from volume-averaged equations

A2. QUESTION STATEMENT:

The form of friction-factor (drag coefficient) correlations for 2-phase slurry flow in pipelines is based on analogy with pipeline flow of single-phase fluids.
Recently (last 15 years) volume-averaged governing equations have been develope

for general multiphase systems. It is our intention to use these volume-averaged equations as a basis for determining the functional form that slurry-flow correlations should have.
The question that we need to know the answer to is "Has this been done before?"
Key words:

- Volume-averaging
- Multiphase Theory
- Two-phase flow
- Slurry and bubbly flows
- Friction factors
- Drag coefficients
- Dimensional analysis
- Settling
- Pneumatic conveying

TYPE OF SEARCH REQUESTED

B. A precise or a broad search: Broad
C. Research application: Graduate study - Chemical Engineering (Proposals - NSF - DOE)
D. Retrieve articles in English only or any language: English
E. Years to be searched: 1976 to 1986
F. DIALOG databases suggested:

QUESTION NUMBER: 033 - PAGE 2

CONTEXT SCALES

	Problem Definition	Intent	Public Knowledge	Internal Knowledge
User	4.0	3.0	4.0	3.0
Searcher				
001	-	-	5.0	2.0
008	-	-	0.0	0.0
017	-	-	3.0	1.0
029	-	-	5.0	4.0
032	-	-	3.0	1.0
119	3.0	2.0	0.0	1.0

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QUESTION NUMBER: 034
DIALOG DATABASE USED: 13 - INSPEC 1977-present
SEARCHER CODE NUMBERS: 017, 008, 029, 032, 001, 119, 219, 319, 419

A1. BRIEF TITLE:

A type of expert system

A2. QUESTION STATEMENT:

Are there any rule based expert systems in which the inference engine does not direct the search? Such a system would provide the user with information to direct the search himself.
An expert system is a computer program that gives advice.
Rule based systems are based on a large set of logical rules.
An inference engine is the part of the program that computes logical inferences from facts entered by the user and from other inferences.
Inference engines commonly direct the search by a method described as backward chaining.

TYPE OF SEARCH REQUESTED

B. A precise or a broad search: Precise
C. Research application: Faculty research - Electrical Engineering
D. Retrieve articles in English only or any language: Any language
E. Years to be searched: No limits
F. DIALOG databases suggested:

CONTEXT SCALES

	Problem Definition	Intent	Public Knowledge	Internal Knowledge
User	4.0	4.0	2.0	3.0
Searcher				
001	-	-	4.0	1.0
008	-	-	0.0	0.0
017	-	-	3.0	1.0
029	-	-	4.0	2.0
032	-	-	3.0	1.0
119	4.0	3.0	2.0	3.0

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QUESTION NUMBER: 035
DIALOG DATABASE USED: 154 - MEDLINE 1980-present
SEARCHER CODE NUMBERS: 008, 017, 001, 029, 032, 120, 220, 320, 420

A1. BRIEF TITLE:

The therapeutic effect of music on oncology patients

A2. QUESTION STATEMENT:

Music therapy is the use of music to positively influence behavior. It has been used to: reduce blood pressure, lower heart rate, decrease pain or act as a distractor of pain, increase verbal expression and participation, boost morale, and most recently act as a means of preparation for visualization and imagery techniques. What are the physiological and emotional effects of music on the patient hospitalized with a chronic illness? How is music therapy currently being used in such settings? How is the progress or effect of the music therapy sessions being measured?
For the passive, comatose, or physically limited patient music has subliminal effects. How can this be employed to benefit the psychological well-being of a patient?

TYPE OF SEARCH REQUESTED

B. A precise or a broad search: Broad
C. Research application: Graduate study - Music
D. Retrieve articles in English only or any language: English
E. Years to be searched: No limits
F. DIALOG databases suggested:

CONTEXT SCALES

	Problem Definition	Intent	Public Knowledge	Internal Knowledge
User	5.0	1.0	2.0	4.0
Searcher				
001	-	-	3.0	4.0
008	-	-	0.0	0.0
017	-	-	4.0	1.0
029	-	-	0.0	1.0
032	-	-	1.0	1.0
120	5.0	2.0	3.0	2.0

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USER QUESTIONS FOR ONLINE SEARCHES

QUESTION NUMBER: 036
DIALOG DATABASE USED: 90 - FOREIGN TRADE & ECON ABSTRACTS
SEARCHER CODE NUMBERS: 012, 023, 025, 036, 007, 120, 220, 320, 420

A1. BRIEF TITLE:

Industrial policy in Western Europe

A2. QUESTION STATEMENT:

I am interested in all sources relating to the above title, but especially in :
(1) Industrial policy and technological innovation;
(2) Industrial policy and re-structuring of industries;
(3) Industrial policy - European economic community;
(4) Industrial policy - Austria;
(5) Industrial policy and corporatism.

TYPE OF SEARCH REQUESTED

B. A precise or a broad search: Broad
C. Research application: Faculty research - Economics
D. Retrieve articles in English only or any language: Any language
E. Years to be searched: Last 5 years
F. DIALOG databases suggested:

CONTEXT SCALES

	Problem Definition	Intent	Public Knowledge	Internal Knowledge
User	5.0	4.0	5.0	3.5
Searcher				
007	-	-	4.0	3.0
012	-	-	4.0	2.0
023	-	-	2.0	1.0
025	-	-	3.0	3.0
036	-	-	5.0	3.0
120	2.0	2.0	2.0	3.0

Form 15 (3/31/86)

NSF PROJECT IST-850 5411
EXPERIMENTS ON THE COGNITIVE ASPECTS OF INFORMATION
SEEKING AND INFORMATION RETRIEVING

USER QUESTIONS FOR ONLINE SEARCHES

QUESTION NUMBER: 037
DIALOG DATABASE USED: 16 - PTS PROMPT
SEARCHER CODE NUMBERS: 030, 015, 034, 035, 041, 119, 219, 319, 419

A1. BRIEF TITLE:

Current awareness, OSHA hazard compliance

A2. QUESTION STATEMENT:

Training of employees (workers) on the right to know (RTK), OSHA hazard compliance laws, chemical safety in the workplace, handling hazardous materials.

TYPE OF SEARCH REQUESTED

B. A precise or a broad search: Broad
C. Research application: Industrial
D. Retrieve articles in English only or any language: English
E. Years to be searched: 1983 to 1986
F. DIALOG databases suggested: Federal Register, Occupational Safety Health

CONTEXT SCALES

	Problem Definition	Intent	Public Knowledge	Internal Knowledge
User	3.0	2.0	4.0	3.0
Searcher				
015	-	-	5.0	3.0
030	-	-	4.0	3.0
034	-	-	4.0	2.0
035	-	-	4.0	4.0
041	-	-	5.0	3.0
119	4.0	3.0	5.0	3.0

Form 15 (3/31/86)

NSF PROJECT IST-850 5411
EXPERIMENTS ON THE COGNITIVE ASPECTS OF INFORMATION SEEKING AND INFORMATION RETRIEVING

USER QUESTIONS FOR ONLINE SEARCHES

QUESTION NUMBER: 038
DIALOG DATABASE USED: 61 - LISA
SEARCHER CODE NUMBERS: 041, 030, 015, 034, 035, 120, 220, 320, 420

A1. BRIEF TITLE:

Impact of new electronic technology in the future of major technical reference libraries

A2. QUESTION STATEMENT:

I serve as the Chairman of the Library Board for the Engineering Societies library in the United Engineering Center in New York City.The library is under considerable attack by the supporting engineering societies (ASME, AIChE, IEEE, ASCE, AIME) for not doing the exciting, glamorous new electronic things which they feel libraries should. We have a financial crisis on day to day operation and are restricted because of this. However, we are planning to have a capital gifts fund drive to get endowment to buy a computer, equipment, and whatever technological advances are deemed appropriaate. We need guidance on what the direction is in the future of document acquisition, cataloging, storing, and information dissemenation. This covers the items like: (1) direct delivery by optical scanning and digitizing of source material for direct transmission over phone lines or by satellite, (2) use of CD-ROMS for information storage - how to transmit to user, who puts information on the CD; (3) justification of computer use for card catalogs information storage; (4) disappearance of traditional role of a reference library this size and what will replace it ($1.3 million/year budget, 1.1 million pages photocopied/year, non-profit organization).

TYPE OF SEARCH REQUESTED

B. A precise or a broad search: Broad
C. Research application: Other
D. Retrieve articles in English only or any language: English
E. Years to be searched: Last 5 years
F. DIALOG databases suggested: ERIC, CA, INSPEC

QUESTION NUMBER: 038 - PAGE 2

CONTEXT SCALES

	Problem Definition	Intent	Public Knowledge	Internal Knowledge
User	5.0	1.0	5.0	3.0
Searcher				
015	-	-	5.0	0.0
030	-	-	4.0	3.0
034	-	-	4.0	4.0
035	-	-	3.0	4.0
041	-	-	4.0	2.0
120	5.0	1.0	5.0	5.0

Form 15 (3/31/86)

NSF PROJECT IST-850 5411
EXPERIMENTS ON THE COGNITIVE ASPECTS OF INFORMATION
SEEKING AND INFORMATION RETRIEVING

USER QUESTIONS FOR ONLINE SEARCHES

QUESTION NUMBER: 039
DIALOG DATABASE USED: 15 - ABI/INFORM
SEARCHER CODE NUMBERS: 035, 041, 030, 015, 034, 119, 219, 319, 419

A1. BRIEF TITLE:

Measurement of organizational environments

A2. QUESTION STATEMENT:

The objective of my overall research is to demonstrate a link between the organizational structure and organizational environment of corporations. The goal of the DIALOG search is to uncover academic works which identify salient environmental components and/or provide practical examples of how to measure those components. The relevant works will likely center on the organization theory literature within the business administration discipline.

The insights gained from this review of literature will be used to develop a questionnaire which will be distributed to corporate managers.

"Organizational environment" refers to the external operating conditions of a firm. These conditions include the forces affecting the firm such as competition, supplier and customer actions, government regulations, and social attitudes. Within these broader categories are thought to be salient components which are critical to the firm's operation. For example, a salient component of the competitive environment might include the pricing strategy of a competing firm.

Key words include:
corporation
firm
company
subsidiary
organization/environment typology
environmental forces
organizational environment
organization
organizational structure
organizational form
environmental components
industry context
industry environment

QUESTION NUMBER: 039 - PAGE 2

TYPE OF SEARCH REQUESTED

B. A precise or a broad search: Precise
C. Research application: Graduate study - Geography
D. Retrieve articles in English only or any language: English
E. Years to be searched: No limits
F. DIALOG databases suggested:

CONTEXT SCALES

	Problem Definition	Intent	Public Knowledge	Internal Knowledge
User	4.0	4.0	4.0	4.0
Searcher				
015	-	-	4.0	3.0
030	-	-	0.0	2.0
034	-	-	4.0	4.0
035	-	-	4.0	3.0
041	-	-	4.0	1.0
119	1.0	4.0	2.0	2.0

Form 15 (3/31/86)

NSF PROJECT IST-850 5411
EXPERIMENTS ON THE COGNITIVE ASPECTS OF INFORMATION
SEEKING AND INFORMATION RETRIEVING

USER QUESTIONS FOR ONLINE SEARCHES

QUESTION NUMBER: 040
DIALOG DATABASE USED: 16 - PTS PROMPT
SEARCHER CODE NUMBERS: 034, 035, 041, 030, 015, 120, 220, 320, 420

A1. BRIEF TITLE:

Technical development and commercial activity in bacterial cloning vectors

A2. QUESTION STATEMENT:

The purpose of this search is to identify the known or proposed techniques for creating bacterial cloning vectors and to identify present or proposed commercial activity regarding the sale, manufacture, or application of bacterial

cloning vectors.

Definitions
Cloning vector - A plasmid or circular piece of DNA (deoxyribonucleic acid) which can be inserted into bacteria which contain new genetic material (genes) which manufacture novel proteins. A cloning vector must contain:
- Origin of replication
- A strong promoter
- Selectable marker

Origin of replication - A location on a cloning vector which permits the genetic duplication of the cloning vector.

Promoter - A specific section of the cloning vector which initiates the transcription of the DNA into RNA and ultimately into proteins."Transcription" is the molecular equivalent of searching and reading a computer file on a magnetic disk.

Selectable marker - A section of the cloning vector which makes a novel protein which can be easily detected by a researcher and which indicates that the cloning vector is operational.

Laboratory sequence for manufacture of cloning vector
- Cultivate bacteria (microbiology)
- Isolate plasmids (biochemical separation)
- Map plasmids (molecular "road map")
- Develop transformation (manipulation techniques for plasmid)
- Purify cell DNA (isolate genetic material of interest)
- Purify cell RNA polymerase (transcription)

QUESTION NUMBER: 040 - PAGE 2

Restriction enzymes - molecular "forceps" which can open up, disect, and resection DNA

Key terms
Gene splicing (inserting genetic material into bacteria)
Recombinant DNA (manmade DNA)

Key information requested
- Scientific papers and review articles
- Patents
- Trade journal reports
- Research company annual reports or Dunn's Broadstreet reports
- Names of companies or institutes associated with:
  - genetic engineering
  - recombinant DNA
  - cloning vector
  - restriction enzyme
  - biotechnology

TYPE OF SEARCH REQUESTED

B. A precise or a broad search: Broad
C. Research application: Industrial- Genetic engineering
D. Retrieve articles in English only or any language: Any language
E. Years to be searched: 1975 to present
F. DIALOG databases suggested: LOCKHEED, PREDICAST, BIONET

CONTEXT SCALES

	Problem Definition	Intent	Public Knowledge	Internal Knowledge
User	2.0	5.0	5.0	4.0
Searcher				
015	-	-	5.0	5.0
030	-	-	0.0	1.0
034	-	-	4.0	3.0
035	-	-	3.0	2.0
041	-	-	5.0	3.0
120	4.0	2.0	3.0	1.0

APPENDIX B

SUMMARY OF SEARCH RESULTS FOR QUESTIONS Q001 TO Q040

APPENDIX B. SUMMARY OF SEARCH RESULTS FOR QUESTIONS Q001 TO Q040

Appendix B contains a page by page summary of the results obtained for each of the 40 questions. Each page, summarizing one question, includes:

1. A summary of items obtained for each question when the search results were combined or merged for all nine searches including:

    A. Total number of relevant items retrieved
    B. Total number of partially relevant items retrieved
    C. Total number of relevant plus partially relevant items retrieved
    D. Total number of not relevant items retrieved
    E. Total number of evaluated items retrieved
    F. Total number of not evaluated items retrieved
    G. Total number of items retrieved

2. A summary of the five utility measures assigned by the user to the question.

3. Search results itemized by the five outside and four project searches. Searcher codes beginning with a 0 are outside searches; searcher codes beginning with 1, 2, 3, and 4 are project searches. Items A. through G. above are used here along with G. Recall, H. Precision, and I. through N. the various efficiency measures.

```
                              Question No. 001
                              Database No. 011

                   *******************************
                   *  Summary of Search Results  *
                   *******************************


                   # Relevant abstracts  :   27
                   # Partially relevant  :   46
              Total # Rel. or Part. rel. :   73
                   # Not relevant        :   75
                   # Evaluated           :  148
                   # Not evaluated       :  626
              Total # of references      :  774
                    Overall precision    : .493

              User evaluation:

                   User's time           : 5.00 hrs.
                   Dollar value assigned : $150.00
                   Worth assigned        :  5
                   Problem resolution    :  4
                   Satisfaction          :  5

              Searcher evaluation:

                   A: # Relevant            H: Precision
                   B: # Partially relevant  I: Total # commands
                   C: # Not relevant        J: Total # cycles
                   D: Total # evaluated     K: Total # search terms
                   E: # Not evaluated       L: Online connect time
                   F: Total # retrieved     M: Preparation time
                   G: Recall                N: Total time

SEAR    A    B    C    D    E    F   G     H       I    J    K   L     M     N

002     3    2    1    6    9   15 0.068 0.833   21    5   13 0.167 0.250 0.417
005     7    2    0    9   11   20 0.123 1.000   22    6   12 0.370 0.117 0.487
013     5    3    0    8   28   36 0.110 1.000   11    3   13 0.301 0.333 0.634
016     1    9   25   35    0   35 0.137 0.286   14    1    9 0.208 0.333 0.541
021    11   30   41   82  443  525 0.562 0.500   19    5   12 0.338 0.250 0.588
119     3    6    6   15   92  107 0.123 0.600    9    4    9 0.098 0.167 0.265
219     0    2    6    8   39   47 0.027 0.250    9    3    4 0.065 0.083 0.148
319     0    1    2    3   41   44 0.013 0.333    8    2   12 0.093 0.083 0.176
419     0    2    0    2    5    7 0.027 1.000   14    4    6 0.092 0.083 0.175
```

Question No. 002
Database No. 218

****
* Summary of Search Results *
****

# Relevant abstracts : 37
# Partially relevant : 36
Total # Rel. or Part. rel. : 73
# Not relevant : 156
Evaluated : 229
Not evaluated : 0
Total # of references : 229
Overall precision : .318

User evaluation:

User's time : 0.50 hrs.
Dollar value assigned : none
Worth assigned : 4
Problem resolution : 3
Satisfaction : 3

Searcher evaluation:

A: # Relevant	H: Precision
B: # Partially relevant	I: Total # commands
C: # Not relevant	J: Total # cycles
D: Total # evaluated	K: Total # search terms
E: # Not evaluated	L: Online connect time
F: Total # retrieved	M: Preparation time
G: Recall	N: Total time

SEAR	A	B	C	D	E	F	G	H	I	J	K	L	M	N
003	5	5	12	22	0	22	0.137	0.455	13	4	8	0.173	0.333	0.506
004	0	0	2	2	0	2	0.000	0.000	18	3	15	0.148	0.100	0.248
006	14	4	7	25	0	25	0.247	0.720	14	3	4	0.205	0.167	0.372
026	16	8	61	85	0	85	0.329	0.282	3	1	3	0.066	0.167	0.233
033	1	1	17	19	0	19	0.027	0.105	23	6	16	0.231	0.133	0.364
120	13	4	13	30	0	30	0.233	0.567	12	2	2	0.204	0.250	0.454
220	16	21	32	69	0	69	0.507	0.536	11	4	7	0.127	0.083	0.210
320	6	1	37	44	0	44	0.095	0.159	17	5	12	0.292	0.083	0.375
420	16	21	32	69	0	69	0.507	0.536	11	3	9	0.173	0.083	0.256

Question No. 003
Database No. 064

****
* Summary of Search Results *
****

# Relevant abstracts : 36
# Partially relevant : 47
Total # Rel. or Part. rel. : 83
# Not relevant : 68
# Evaluated : 151
# Not evaluated : 272
Total # of references : 423
Overall precision : .549

User evaluation:

User's time : 3.58 hrs.
Dollar value assigned : $30.00
Worth assigned : 3
Problem resolution : 3
Satisfaction : 4

Searcher evaluation:

A: # Relevant
B: # Partially relevant
C: # Not relevant
D: Total # evaluated
E: # Not evaluated
F: Total # retrieved
G: Recall
H: Precision
I: Total # commands
J: Total # cycles
K: Total # search terms
L: Online connect time
M: Preparation time
N: Total time

SEAR	A	B	C	D	E	F	G	H	I	J	K	L	M	N
002	9	18	26	53	10	63	0.325	0.509	14	5	13	0.167	0.250	0.417
014	1	2	1	4	12	16	0.036	0.750	4	1	6	0.059	0.167	0.226
016	0	0	0	0	117	117	0.000	0.000	17	1	7	0.536	0.333	0.869
021	13	29	34	76	85	161	0.506	0.553	13	4	8	0.165	0.250	0.415
033	0	2	0	2	3	5	0.024	1.000	16	4	11	0.167	0.100	0.267
118	1	0	1	2	2	4	0.012	0.500	17	7	8	0.418	0.333	0.751
218	12	8	15	35	54	89	0.241	0.571	8	2	10	0.184	0.333	0.517
318	7	3	1	11	19	30	0.120	0.909	19	5	13	0.422	0.250	0.672
418	1	1	3	5	10	15	0.024	0.400	2	1	3	0.044	0.250	0.294

```
                         Question No. 004
                         Database No. 154

                *******************************
                *  Summary of Search Results  *
                *******************************

                # Relevant abstracts  :   60
                # Partially relevant  :   58
          Total # Rel. or Part. rel.  :  118
                # Not relevant        :   33
                # Evaluated           :  151
                # Not evaluated       :    8
          Total # of references       :  159
                Overall precision     : .781

          User evaluation:

                User's time             : 4.00 hrs.
                Dollar value assigned   : none
                Worth assigned          :  5
                Problem resolution      :  3
                Satisfaction            :  4

          Searcher evaluation:

                A: # Relevant             H: Precision
                B: # Partially relevant   I: Total # commands
                C: # Not relevant         J: Total # cycles
                D: Total # evaluated      K: Total # search terms
                E: # Not evaluated        L: Online connect time
                F: Total # retrieved      M: Preparation time
                G: Recall                 N: Total time

SEAR   A    B    C    D    E    F    G       H       I    J    K    L      M      N

009    6    1    3   10    1   11 0.059  0.700     23    6   10 0.145  0.300  0.445
010   11   14    7   32    1   33 0.212  0.781     17    6    6 0.303  0.417  0.720
024   28    8    5   41    1   42 0.305  0.878     18    6    7 0.194  0.167  0.361
028    5    0    4    9    1   10 0.042  0.556     14    3   13 0.148  0.250  0.398
037   12   12   10   34    2   36 0.203  0.706     12    5    5 0.168  0.066  0.234
120    5    0    0    5    0    5 0.042  1.000     18    6   10 0.350  0.417  0.767
220    7   13    2   22    2   24 0.169  0.909     20    5    9 0.388  0.250  0.638
320   22   30   13   65    1   66 0.441  0.800     11    2   10 0.342  0.133  0.475
420    4    1    0    5    0    5 0.042  1.000      7    2    9 0.134  0.333  0.467
```

```
                          Question No. 005
                          Database No. 148

                 ******************************
                 *  Summary of Search Results  *
                 ******************************


                  # Relevant abstracts  :   16
                  # Partially relevant  :   23
            Total # Rel. or Part. rel.  :   39
                  # Not relevant        :   48
                  # Evaluated           :   87
                  # Not evaluated       :    0
            Total # of references       :   87
                  Overall precision     : .448


            User evaluation:

                 User's time              : 0.67 hrs.
                 Dollar value assigned    : $100.00
                 Worth assigned           :  4
                 Problem resolution       :  3
                 Satisfaction             :  2


            Searcher evaluation:

                 A: # Relevant            H: Precision
                 B: # Partially relevant  I: Total # commands
                 C: # Not relevant        J: Total # cycles
                 D: Total # evaluated     K: Total # search terms
                 E: # Not evaluated       L: Online connect time
                 F: Total # retrieved     M: Preparation time
                 G: Recall                N: Total time


SEAR    A    B    C    D    E    F    G      H        I    J    K   L      M      N

003     7   15   11   33    0   33 0.564 0.667      10    4    4 0.123 0.167 0.290
004     1    2    4    7    0    7 0.076 0.429      11    3    4 0.202 0.083 0.285
006     1    3    2    6    0    6 0.103 0.667      11    2    6 0.234 0.167 0.401
013     0    0    0    0    0    0 0.000 0.000      13    3   21 0.345 0.167 0.512
026     1    0    3    4    0    4 0.025 0.250      19    6   13 0.446 0.500 0.946
120     6    9    7   22    0   22 0.385 0.682      14    4    6 0.249 0.333 0.582
220     7   15   13   35    0   35 0.564 0.629      12    4   10 0.285 0.167 0.452
320     9    4    7   20    0   20 0.333 0.650      19    3   18 0.228 0.167 0.395
420     0    6   27   33    0   33 0.154 0.182       7    3    5 0.123 0.083 0.206
```

```
                              Question No. 006
                              Database No. 006

                    ********************************
                    *  Summary of Search Results  *
                    ********************************


                # Relevant abstracts  :   11
                # Partially relevant  :    5
          Total # Rel. or Part. rel.  :   16
                # Not relevant        :  134
                # Evaluated           :  150
                # Not evaluated       :   88
          Total # of references       :  238
                Overall precision     : .106


          User evaluation:


               User's time              : 3.00 hrs.
               Dollar value assigned : none
               Worth assigned           :  2
               Problem resolution       :  2
               Satisfaction             :  3


          Searcher evaluation:


               A: # Relevant              H: Precision
               B: # Partially relevant  I: Total # commands
               C: # Not relevant          J: Total # cycles
               D: Total # evaluated       K: Total # search terms
               E: # Not evaluated         L: Online connect time
               F: Total # retrieved       M: Preparation time
               G: Recall                  N: Total time


SEAR    A    B    C    D    E    F    G      H        I    J    K    L     M     N

011     0    0    0    0    1    1 0.000 0.000     41    6   12 1.123 0.833 1.956
027     0    1   67   68   47  115 0.062 0.014     15    2   11 0.184 0.083 0.267
038     0    0    2    2    1    3 0.000 0.000     18    4   13 0.036 0.250 0.286
039     2    4   39   45   20   65 0.375 0.133     21    6   10 0.250 0.250 0.500
040     0    0    4    4    0    4 0.000 0.000     38   13   13 0.670 0.117 0.787
120    11    0    1   12    1   13 0.688 0.917      4    2    6 0.071 0.167 0.238
220     0    0    6    6    3    9 0.000 0.000     12    3    6 0.186 0.050 0.236
320     0    0    6    6    3    9 0.000 0.000      8    2   10 0.157 0.050 0.207
420    11    0   25   36   24   60 0.688 0.306     11    3    6 0.189 0.050 0.239
```

```
                        Question No. 007
                        Database No. 075

             ********************************
             *  Summary of Search Results   *
             ********************************

             # Relevant abstracts  :   70
             # Partially relevant  :   39
       Total # Rel. or Part. rel.  :  109
             # Not relevant        :   40
             # Evaluated           :  149
             # Not evaluated       :  335
       Total # ¬f references       :  484
             Overall precision     : .731

       User evaluation:

             User's time             : 2.00 hrs.
             Dollar value assigned : none
             Worth assigned          :  5
             Problem resolution      :  4
             Satisfaction            :  5

       Searcher evaluation:

             A: # Relevant           H: Precision
             B: # Partially relevant I: Total # commands
             C: # Not relevant       J: Total # cycles
             D: Total # evaluated    K: Total # search terms
             E: # Not evaluated      L: Online connect time
             F: Total # retrieved    M: Preparation time
             G: Recall               N: Total time

SEAR   A    B    C    D    E    F    G      H       I    J    K   L     M     N

003    1    3    1    5    0    5 0.036 0.800     8    2    8 0.108 0.250 0.358
004   16   23   28   67  278  345 0.358 0.582    24    6   14 0.441 0.167 0.608
006    0    0    0    0    0    0 0.000 0.000     7    3    4 0.185 0.250 0.435
014    1    0    1    2   10   12 0.009 0.500     6    1    9 0.063 0.117 0.180
026    3    1    1    5   13   18 0.036 0.800    14    2   15 0.355 0.500 0.855
119   14    7    4   25   13   38 0.193 0.840     7    1    5 0.132 0.250 0.382
219   22    7    1   30    3   33 0.266 0.967    11    3    5 0.114 0.250 0.364
319   19    6    7   32    9   41 0.229 0.781    13    2   16 0.199 0.250 0.449
419   41    7    5   53   24   77 0.440 0.906    10    2    5 0.105 0.250 0.355
```

Question No. 008
Database No. 154

****

* Summary of Search Results *

****

# Relevant abstracts : 2
# Partially relevant : 5
Total # Rel. or Part. rel. : 7
# Not relevant : 54
# Evaluated : 61
# Not evaluated : 0
Total # of references : 61
Overall precision : .114

User evaluation:

User's time : 0.75 hrs.
Dollar value assigned : none
Worth assigned : 3
Problem resolution : 2
Satisfaction : 3

Searcher evaluation:

A: # Relevant
B: # Partially relevant
C: # Not relevant
D: Total # evaluated
E: # Not evaluated
F: Total # retrieved
G: Recall
H: Precision
I: Total # commands
J: Total # cycles
K: Total # search terms
L: Online connect time
M: Preparation time
N: Total time

SEAR	A	B	C	D	E	F	G	H	I	J	K	L	M	N
009	0	0	8	8	0	8	0.000	0.000	12	3	8	0.092	0.250	0.342
010	2	3	51	56	0	56	0.714	0.089	8	2	4	0.156	0.233	0.389
024	2	3	34	39	0	39	0.714	0.128	9	2	4	0.065	0.117	0.182
028	0	0	3	3	0	3	0.000	0.000	5	1	4	0.113	0.250	0.363
037	2	0	11	13	0	13	0.286	0.154	14	4	4	0.111	0.133	0.244
120	2	4	9	15	0	15	0.857	0.400	9	3	8	0.222	0.217	0.439
220	2	2	5	9	0	9	0.571	0.444	12	5	10	0.312	0.250	0.562
320	0	0	1	1	0	1	0.000	0.000	9	3	12	0.260	0.083	0.343
420	2	4	35	41	0	41	0.857	0.146	7	2	11	0.141	0.333	0.474

```
                    Question No. 009
                    Database No. 037

          *********************************
          *  Summary of Search Results  *
          *******************************


          # Relevant abstracts   :   18
          # Partially relevant   :   48
    Total # Rel. or Part. rel.   :   66
          # Not relevant         :   84
          # Evaluated            :  150
          # Not evaluated        :  495
    Total # of references        :  645
          Overall precision      : .440

    User evaluation:

          User's time             : 3.00 hrs.
          Dollar value assigned   : none
          Worth assigned          :  4
          Problem resolution      :  2
          Satisfaction            :  3

    Searcher evaluation:

          A: # Relevant           H: Precision
          B: # Partially relevant I: Total # commands
          C: # Not relevant       J: Total # cycles
          D: Total # evaluated    K: Total # search terms
          E: # Not evaluated      L: Online connect time
          F: Total # retrieved    M: Preparation time
          G: Recall               N: Total time

SEAR   A    B    C    D    E    F    G     H      I    J    K    L     M     N

002    1    6    2    9   45   54 0.106 0.778   24    6   18 0.273 0.250 0.523
014    2    6   29   37   97  134 0.121 0.216    8    2    3 0.111 0.250 0.361
016    0    3   27   30   54   84 0.045 0.100   13    1    6 0.163 0.500 0.663
021    1    3    2    6   52   58 0.060 0.667   13    4    8 0.157 0.200 0.357
033    1    5    0    6   26   32 0.090 1.000    9    3   11 0.143 0.066 0.209
119    5   15   15   35  112  147 0.303 0.571   20    5    8 0.163 0.333 0.496
219    0    3    0    3   20   23 0.045 1.000    5    2    3 0.046 0.167 0.213
319    3    7    3   13   55   68 0.152 0.769    6    2    4 0.091 0.083 0.174
419    9   28   19   56  210  266 0.561 0.661   11    4    7 0.006 0.250 0.256
```

Question No. 010
Database No. 154

****
* Summary of Search Results *
****

# Relevant abstracts : 4
# Partially relevant : 15
Total # Rel. or Part. rel. : 19
Not relevant : 130
Evaluated : 149
Not evaluated : 310
Total # of references : 459
Overall precision : .127

User evaluation:

User's time : 5.50 hrs.
Dollar value assigned : $5.00
Worth assigned : 4
Problem resolution : 2
Satisfaction : 3

Searcher evaluation:

A: # Relevant
B: # Partially relevant
C: # Not relevant
D: Total # evaluated
E: # Not evaluated
F: Total # retrieved
G: Recall
H: Precision
I: Total # commands
J: Total # cycles
K: Total # search terms
L: Online connect time
M: Preparation time
N: Total time

SEAR	A	B	C	D	E	F	G	H	I	J	K	L	M	N
009	1	0	0	1	3	4	0.052	1.000	20	7	8	0.111	0.167	0.278
010	0	0	28	28	72	100	0.000	0.000	15	5	7	0.234	0.200	0.434
024	2	0	3	5	14	19	0.105	0.400	38	5	25	0.525	0.167	0.692
028	0	0	4	4	18	22	0.000	0.000	11	3	9	0.139	0.250	0.389
037	2	1	2	5	13	18	0.158	0.600	10	2	7	0.136	0.200	0.336
120	3	14	31	48	103	151	0.895	0.354	16	5	10	0.121	0.667	0.788
220	1	5	4	10	23	33	0.316	0.600	24	8	13	0.445	0.167	0.612
320	1	8	89	98	172	270	0.474	0.091	17	3	12	0.467	0.083	0.550
420	1	0	8	9	24	33	0.052	0.111	11	2	9	0.215	0.167	0.382

Question No. 011
Database No. 154

****
* Summary of Search Results *
****

# Relevant abstracts : 9
# Partially relevant : 25
Total # Rel. or Part. rel. : 34
# Not relevant : 115
# Evaluated : 149
# Not evaluated : 161
Total # of references : 310
Overall precision : .228

User evaluation:

User's time : 1.92 hrs.
Dollar value assigned : none
Worth assigned : 4
Problem resolution : 4
Satisfaction : 5

Searcher evaluation:

A: # Relevant
B: # Partially relevant
C: # Not relevant
D: Total # evaluated
E: # Not evaluated
F: Total # retrieved
G: Recall
H: Precision
I: Total # commands
J: Total # cycles
K: Total # search terms
L: Online connect time
M: Preparation time
N: Total time

SEAR	A	B	C	D	E	F	G	H	I	J	K	L	M	N
009	1	0	1	2	7	9	0.029	0.500	5	1	14	0.074	0.250	0.324
010	3	6	31	40	58	98	0.265	0.225	5	2	9	0.170	0.250	0.420
024	2	6	15	23	22	45	0.235	0.348	9	1	4	0.071	0.083	0.154
028	2	6	19	27	27	54	0.235	0.296	12	3	13	0.263	0.333	0.596
037	0	1	1	2	3	5	0.029	0.500	9	3	8	0.083	0.167	0.250
119	8	15	70	93	105	198	0.676	0.247	16	3	4	0.238	0.333	0.571
219	6	10	61	77	93	170	0.471	0.208	9	1	9	0.166	0.083	0.249
319	1	1	10	12	9	21	0.058	0.167	6	1	5	0.052	0.167	0.219
419	2	1	14	17	13	30	0.088	0.176	7	1	9	0.080	0.250	0.330

```
                    Question No. 012
                    Database No. 013

          ********************************
          *  Summary of Search Results   *
          ********************************

           # Relevant abstracts   :    6
           # Partially relevant   :   21
     Total # Rel. or Part. rel.   :   27
           # Not relevant         :  121
           # Evaluated            :  148
           # Not evaluated        :   90
     Total # of references        :  238
           Overall precision      : .182

     User evaluation:

          User's time            : 2.50 hrs.
          Dollar value assigned  : none
          Worth assigned         :  3
          Problem resolution     :  2
          Satisfaction           :  1

     Searcher evaluation:

          A: # Relevant             H: Precision
          B: # Partially relevant   I: Total # commands
          C: # Not relevant         J: Total # cycles
          D: Total # evaluated      K: Total # search terms
          E: # Not evaluated        L: Online connect time
          F: Total # retrieved      M: Preparation time
          G: Recall                 N: Total time
```

SEAR	A	B	C	D	E	F	G	H	I	J	K	L	M	N
005	0	3	30	33	17	50	0.111	0.090	17	4	19	0.420	0.250	0.670
011	4	9	31	44	38	82	0.481	0.295	37	2	33	0.898	0.250	1.148
027	1	4	7	12	7	19	0.185	0.417	14	2	8	0.150	0.333	0.483
029	0	4	5	9	4	13	0.148	0.444	7	2	4	0.151	0.583	0.734
040	1	1	2	4	3	7	0.074	0.500	41	6	61	0.723	0.583	1.306
119	1	4	54	59	30	89	0.185	0.084	11	3	16	0.204	0.417	0.621
219	0	6	9	15	4	19	0.222	0.400	18	3	32	0.382	0.250	0.632
319	0	6	9	15	4	19	0.222	0.400	14	2	31	0.348	0.167	0.515
419	1	7	19	27	11	38	0.296	0.296	9	2	12	0.202	0.167	0.369

```
                         Question No. 013
                         Database No. 015

               ********************************
               *  Summary of Search Results   *
               ********************************

               # Relevant abstracts   :    7
               # Partially relevant   :   36
         Total # Rel. or Part. rel.   :   43
               # Not relevant         :  106
               # Evaluated            :  149
               # Not evaluated        :   14
         Total # of references        :  163
               Overall precision      : .288

         User evaluation:

               User's time            : 3.00 hrs.
               Dollar value assigned  : $50.00
               Worth assigned         :  2
               Problem resolution     :  2
               Satisfaction           :  2

         Searcher evaluation:

               A: # Relevant               H: Precision
               B: # Partially relevant     I: Total # commands
               C: # Not relevant           J: Total # cycles
               D: Total # evaluated        K: Total # search terms
               E: # Not evaluated          L: Online connect time
               F: Total # retrieved        M: Preparation time
               G: Recall                   N: Total time

SEAR    A     B     C     D     E     F    G      H        I     J     K  L      M      N

003     3     5    22    30     3    33 0.186  0.267     29     6    18 0.404  0.417  0.821
004     1     1     0     2     0     2 0.046  1.000     17     3    11 0.158  0.150  0.308
006     2     8    19    29     1    30 0.233  0.345     11     1     6 0.145  0.250  0.395
013     3    18    39    60     5    65 0.488  0.350     11     3     6 0.206  0.083  0.289
026     4    14    37    55     7    62 0.419  0.327     11     1     6 0.153  0.333  0.486
120     2     6     6    14     1    15 0.186  0.571     22     5     4 0.255  0.250  0.505
220     2     0     2     4     0     4 0.046  0.500      8     2     6 0.154  0.066  0.220
320     3     7    18    28     2    30 0.233  0.357     20     5    23 0.270  0.167  0.437
420     3     8     9    20     2    22 0.256  0.550     11     2     7 0.154  0.050  0.204
```

```
                              Question No. 014
                              Database No. 151

                  ********************************
                  *  Summary of Search Results   *
                  ********************************


                   # Relevant abstracts  :   35
                   # Partially relevant  :   71
              Total # Rel. or Part. rel. :  106
                   # Not relevant        :   51
                   # Evaluated           :  157
                   # Not evaluated       :  . 2
              Total # of references      :  159
                   Overall precision     : .675

              User evaluation:


                  User's time            : 0.75 hrs.
                  Dollar value assigned  : none
                  Worth assigned         :  3
                  Problem resolution     :  1
                  Satisfaction           :  2

              Searcher evaluation:


                  A: # Relevant            H: Precision
                  B: # Partially relevant  I: Total # commands
                  C: # Not relevant        J: Total # cycles
                  D: Total # evaluated     K: Total # search terms
                  E: # Not evaluated       L: Online connect time
                  F: Total # retrieved     M: Preparation time
                  G: Recall                N: Total time


SEAR    A    B    C    D    E    F   G     H       I    J    K   L     M     N

003    16   26    9   51    1   52 0.396 0.824   15    2   11 0.314 0.583 0.897
004    10   15    5   30    1   31 0.236 0.833   18    2   11 0.248 0.233 0.481
006    11   19    7   37    2   39 0.283 0.811   11    2   12 0.173 0.167 0.340
026     0    1   32   33    0   33 0.009 0.030   11    2    7 0.158 0.250 0.408
033    24   50   14   88    1   89 0.698 0.841   10    4   11 0.138 0.066 0.204
120     7    7    3   17    1   18 0.132 0.824   10    3    6 0.221 0.250 0.471
220     5   11    5   21    0   21 0.151 0.762   10    3   16 0.234 0.083 0.317
320     4   15    7   26    0   26 0.179 0.731   18    5   19 0.349 0.217 0.566
420     4    4    1    9    1   10 0.075 0.889   15    2   11 0.196 0.167 0.363
```

```
                     Question No. 015
                     Database No. 154

            ********************************
            *  Summary of Search Results  *
            ********************************


            # Relevant abstracts  :   28
            # Partially relevant  :   86
      Total # Rel. or Part. rel.  :  114
            # Not relevant        :   36
            # Evaluated           :  150
            # Not evaluated       :  172
      Total # of references       :  322
            Overall precision     : .760

      User evaluation:


           User's time           : 4.00 hrs.
           Dollar value assigned : $50.00
           Worth assigned        :  5
           Problem resolution    :  4
           Satisfaction          :  4


      Searcher evaluation:


           A: # Relevant           H: Precision
           B: # Partially relevant I: Total # commands
           C: # Not relevant       J: Total # cycles
           D: Total # evaluated    K: Total # search terms
           E: # Not evaluated      L: Online connect time
           F: Total # retrieved    M: Preparation time
           G: Recall               N: Total time


SEAR    A    B    C    D    E    F   G      H        I    J    K  L     M     N

009     9   12    3   24   36   60 0.184 0.875    13    2    8 0.186 0.167 0.353
010    27   61   30  118  144  262 0.772 0.746     6    1    1 0.191 0.133 0.324
024    14   25    5   44   63  107 0.342 0.886    19    1   20 0.178 0.033 0.211
028    22   41   12   75  105  180 0.553 0.840     7    1    6 0.227 0.117 0.344
037    13   21    9   43   52   95 0.298 0.791     9    2    3 0.234 0.133 0.367
120    26   59   18  103  118  221 0.746 0.825    16    5    4 0.324 0.333 0.657
220    25   44   17   86  112  198 0.605 0.802     4    1    9 0.252 0.083 0.335
320    19   24    7   50   57  107 0.377 0.860    10    2   13 0.196 0.083 0.279
420    23   33   10   66   75  141 0.491 0.848    12    2   10 0.258 0.100 0.358
```

```
                    Question No. 016
                    Database No. 011

          *******************************
          *  Summary of Search Results  *
          *******************************


           # Relevant abstracts  :   25
           # Partially relevant  :   37
     Total # Rel. or Part. rel.  :   62
           # Not relevant        :  108
           # Evaluated           :  170
           # Not evaluated       :    0
     Total # of references       :  170
           Overall precision     : .364

     User evaluation:


          User's time            : 4.00 hrs.
          Dollar value assigned  : $75.00
          Worth assigned         :  4
          Problem resolution     :  4
          Satisfaction           :  5

     Searcher evaluation:


          A: # Relevant           H: Precision
          B: # Partially relevant I: Total # commands
          C: # Not relevant       J: Total # cycles
          D: Total # evaluated    K: Total # search terms
          E: # Not evaluated      L: Online connect time
          F: Total # retrieved    M: Preparation time
          G: Recall               N: Total time


SEAR   A    B    C    D    E    F   G     H        I    J    K   L     M     N

002   20   21   30   71    0   71 0.661 0.577     6    2    3 0.058 0.167 0.225
005    2    3    3    8    0    8 0.080 0.625    11    3   13 0.154 0.117 0.271
013    4    4   37   45    0   45 0.129 0.178     9    3    2 0.141 0.117 0.258
016   15   17   27   59    0   59 0.516 0.542     8    1    5 0.191 0.250 0.441
021    3    4   20   27    0   27 0.113 0.259     7    3    4 0.097 0.250 0.347
120    2    3    7   12    0   12 0.080 0.417    15    5    8 0.333 0.417 0.750
220    6    7   11   24    0   24 0.210 0.542     9    3    6 0.157 0.083 0.240
320    7    8   23   38    0   38 0.242 0.395    15    4   22 0.348 0.100 0.448
420    1    5   12   18    0   18 0.096 0.333    11    2   12 0.154 0.167 0.321
```

Question No. 017
Database No. 005

****
* Summary of Search Results *
****

# Relevant abstracts : 36
# Partially relevant : 26
Total # Rel. or Part. rel. : 62
# Not relevant : 88
# Evaluated : 150
# Not evaluated : 377
Total # of references : 527
Overall precision : .413

User evaluation:

User's time : 1.00 hrs.
Dollar value assigned : $10.00
Worth assigned : 2
Problem resolution : 2
Satisfaction : 2

Searcher evaluation:

A: # Relevant
B: # Partially relevant
C: # Not relevant
D: Total # evaluated
E: # Not evaluated
F: Total # retrieved
G: Recall
H: Precision
I: Total # commands
J: Total # cycles
K: Total # search terms
L: Online connect time
M: Preparation time
N: Total time

SEAR	A	B	C	D	E	F	G	H	I	J	K	L	M	N
011	6	9	38	53	64	117	0.242	0.283	20	2	11	0.378	0.250	0.628
027	4	2	18	24	135	159	0.096	0.250	18	3	16	0.286	0.167	0.453
038	0	1	0	1	0	1	0.016	1.000	13	3	9	0.095	0.217	0.312
039	22	9	8	39	94	133	0.500	0.795	18	3	12	0.301	0.250	0.551
040	7	6	19	32	75	107	0.210	0.406	21	3	9	0.409	0.117	0.526
119	5	0	0	5	11	16	0.080	1.000	20	5	19	0.346	0.250	0.596
219	0	3	21	24	23	47	0.048	0.125	9	2	7	0.110	0.167	0.277
319	3	0	4	7	13	20	0.048	0.429	12	3	13	0.172	0.083	0.255
419	1	1	3	5	25	30	0.032	0.400	29	3	6	0.203	0.083	0.286

```
                        Question No. 018
                        Database No. 015

              *******************************
              *  Summary of Search Results  *
              *******************************

              # Relevant abstracts  :   66
              # Partially relevant  :   38
        Total # Rel. or Part. rel.  :  104
              # Not relevant        :   46
              # Evaluated           :  150
              # Not evaluated       :  612
        Total # of references       :  762
              Overall precision     : .693

        User evaluation:

              User's time            : 3.50 hrs.
              Dollar value assigned  : none
              Worth assigned         :  4
              Problem resolution     :  3
              Satisfaction           :  3

        Searcher evaluation:

              A: # Relevant            H: Precision
              B: # Partially relevant  I: Total # commands
              C: # Not relevant        J: Total # cycles
              D: Total # evaluated     K: Total # search terms
              E: # Not evaluated       L: Online connect time
              F: Total # retrieved     M: Preparation time
              G: Recall                N: Total time

SEAR    A    B    C    D    E    F   G     H       I    J    K   L     M     N

003     0    0    0    0    0    0 0.000 0.000    28    7   24 0.438 0.333 0.771
004    55   29   31  115  541  656 0.808 0.730    29    5   26 0.497 0.250 0.747
006    18   11   10   39   30   69 0.279 0.744    15    2    6 0.259 0.167 0.426
014     0    0    0    0    0    0 0.000 0.000     5    2    5 0.193 0.083 0.276
026     0    0    0    0    0    0 0.000 0.000    14    2   14 0.286 0.250 0.536
119     0    0    2    2    9   11 0.000 0.000    12    3    7 0.170 0.500 0.670
219     9    4    7   20   45   65 0.125 0.650    11    3    5 0.130 0.167 0.297
319     0    0    0    0    1    1 0.000 0.000     9    2   13 0.136 00.167 0.303
419     1    1    0    2   13   15 0.019 1.000    12    3   10 0.205 0.167 0.372
```

```
                              Question No. 019
                              Database No. 075

                  ********************************
                  *  Summary of Search Results  *
                  ********************************


                   # Relevant abstracts  :   27
                   # Partially relevant  :   49
              Total # Rel or Part. rel.   :   76
                   # Not relevant        :   74
                   # Evaluated           :  150
                   # Not evaluated       :   52
              Total # of references       :  202
                   Overall precision     : .506


              User evaluation:


                  User's time           : 1.25 hrs.
                  Dollar value assigned : none
                  Worth assigned        :  5
                  Problem resolution    :  3
                  Satisfaction          :  4


              Searcher evaluation:


                  A: # Relevant            H: Precision
                  B: # Partially relevant  I: Total # commands
                  C: # Not relevant        J: Total # cycles
                  D: Total # evaluated     K: Total # search terms
                  E: # Not evaluated       L: Online connect time
                  F: Total # retrieved     M: Preparation time
                  G: Recall                N: Total time


SEAR    A    B    C    D    E    F    G     H      I    J    K    L     M     N

001     0    0    1    1    1    2 0.000 0.000    16    2    8 0.305 0.417 0.722
005     4    5    3   12    1   13 0.118 0.750    10    4    9 0.189 0.133 0.322
008     6   15   15   36    4   40 0.276 0.583    26    9    8 0.272 0.133 0.405
013     6   12    2   20    5   25 0.237 0.900     8    1    5 0.157 0.167 0.324
017     7   14   22   43   18   61 0.276 0.488    11    3    7 0.176 0.250 0.426
119    12   24   45   81   39  120 0.474 0.444    13    2    8 0.209 0.333 0.542
319    10   16   13   39   10   49 0.342 0.667    11    2    9 0.104 0.066 0.170
219    12    4    3   19    2   21 0.211 0.842    14    2    6 0.128 0.167 0.295
419    14   11   14   39    8   47 0.329 0.641     6    1    7 0.072 0.100 0.172
```

Question No. 020
Database No. 015

****
* Summary of Search Results *
****

Relevant abstracts : 26
# Partially relevant : 43
Total # Rel. or Part. rel. : 69
Not relevant : 81
Evaluated : 150
Not evaluated : 161
Total # of references : 311
Overall precision : .460

User evaluation:

User's time : 1.50 hrs.
Dollar value assigned : none
Worth assigned : 5
Problem resolution : 3
Satisfaction : 5

Searcher evaluation:

A: # Relevant	H: Precision
B: # Partially relevant	I: Total # commands
C: # Not relevant	J: Total # cycles
D: Total # evaluated	K: Total # search terms
E: # Not evaluated	L: Online connect time
F: Total # retrieved	M: Preparation time
G: Recall	N: Total time

SEAR	A	B	C	D	E	F	G	H	I	J	K	L	M	N
001	0	1	1	2	2	4	0.014	0.500	13	2	4	0.239	0.333	0.572
005	1	0	3	4	5	9	0.014	0.250	17	6	15	0.346	0.133	0.479
013	5	11	33	49	43	92	0.232	0.327	14	4	5	0.141	0.117	0.258
017	0	4	10	14	25	39	0.058	0.286	18	5	8	0.227	0.167	0.394
032	2	2	6	10	8	18	0.058	0.400	10	2	4	0.133	0.083	0.216
119	19	24	28	71	56	127	0.623	0.606	15	2	10	0.252	0.333	0.585
219	3	5	11	19	35	54	0.116	0.421	21	4	12	0.198	0.167	0.365
319	1	2	2	5	13	18	0.043	0.600	5	1	4	0.050	0.066	0.116
419	3	6	3	12	8	20	0.130	0.750	16	4	9	0.127	0.033	0.160

Question No. 021
Database No. 037

****
* Summary of Search Results *
****

	# Relevant abstracts	19
	# Partially relevant	6
Total	# Rel. or Part. rel.	25
	# Not relevant	77
	# Evaluated	102
	# Not evaluated	0
Total	# of references	102
	Overall precision	.245

User evaluation:

User's time	1.25 hrs.
Dollar value assigned	$30.00
Worth assigned	5
Problem resolution	4
Satisfaction	4

Searcher evaluation:

A: # Relevant
B: # Partially relevant
C: # Not relevant
D: Total # evaluated
E: # Not evaluated
F: Total # retrieved
G: Recall
H: Precision
I: Total # commands
J: Total # cycles
K: Total # search terms
L: Online connect time
M: Preparation time
N: Total time

SEAR	A	B	C	D	E	F	G	H	I	J	K	L	M	N
002	6	0	9	15	0	15	0.240	0.400	30	7	30	0.387	0.250	0.637
014	1	0	0	1	0	1	0.040	1.000	11	3	4	0.230	0.133	0.363
016	0	2	28	30	0	30	0.080	0.066	17	3	11	0.416	0.500	0.916
021	0	1	5	6	0	6	0.040	0.167	21	5	15	0.327	0.583	0.910
033	11	3	31	45	0	45	0.560	0.311	20	6	14	0.220	0.066	0.286
120	3	0	0	3	0	3	0.120	1.000	13	3	12	0.320	0.333	0.653
220	4	0	1	5	0	5	0.160	0.800	19	4	17	0.443	0.083	0.526
320	6	0	1	7	0	7	0.240	0.857	11	3	9	0.212	0.083	0.295
420	0	0	2	2	0	2	0.000	0.000	11	3	11	0.171	0.167	0.338

```
                       Question No. 022
                       Database No. 108

               ********************************
               *  Summary of Search Results  *
               ********************************


                # Relevant abstracts  :   15
                # Partially relevant  :  135
          Total # Rel. or Part. rel.  :  150
                # Not relevant        :    0
                # Evaluated           :  150
                # Not evaluated       :  365
          Total # of references       :  515
                Overall precision     :  1.0


          User evaluation:


               User's time             : 1.00 hrs.
               Dollar value assigned : $10.00
               Worth assigned          :  3
               Problem resolution      :  2
               Satisfaction            :  2


          Searcher evaluation:


               A: # Relevant              H: Precision
               B: # Partially relevant    I: Total # commands
               C: # Not relevant          J: Total # cycles
               D: Total # evaluated       K: Total # search terms
               E: # Not evaluated         L: Online connect time
               F: Total # retrieved       M: Preparation time
               G: Recall                  N: Total time


SEAR     A     B     C     D     E     F     G       H        I      J     K    L     M     N

008      2    18     0    20    83   103 0.133 1.000       14      4    22 0.260 0.167 0.427
027      6    60     0    66    68   134 0.440 1.000       13      1     7 0.213 0.250 0.463
032      1     5     0     6     8    14 0.040 1.000        9      2     8 0.174 0.083 0.257
038      1     5     0     6    11    17 0.040 1.000       18      6    10 0.148 0.167 0.315
039      0     6     0     6    64    70 0.040 1.000       26      6     9 0.306 0.250 0.556
119     12   113     0   125   154   279 0.833 1.000       18      4    10 0.250 0.117 0.367
219      1    13     0    14    67    81 0.093 1.000       11      3    15 0.179 0.200 0.379
319      0     2     0     2     0     2 0.013 1.000       24      3    31 0.348 0.250 0.598
419      2    13     0    15    97   112 0.100 1.000        9      2    11 0.113 0.250 0.363
```

Question No. 023
Database No. 032

****
* Summary of Search Results *
****

# Relevant abstracts	:	29
# Partially relevant	:	9
Total # Rel. or Part. rel.	:	38
# Not relevant	:	51
# Evaluated	:	89
# Not evaluated	:	0
Total # of references	:	89
Overall precision	:	.426

User evaluation:

User's time	:	1.50 hrs.
Dollar value assigned	:	none
Worth assigned	:	5
Problem resolution	:	4
Satisfaction	:	5

Searcher evaluation:

A: # Relevant
B: # Partially relevant
C: # Not relevant
D: Total # evaluated
E: # Not evaluated
F: Total # retrieved
G: Recall
H: Precision
I: Total # commands
J: Total # cycles
K: Total # search terms
L: Online connect time
M: Preparation time
N: Total time

SEAR	A	B	C	D	E	F	G	H	I	J	K	L	M	N
015	23	3	9	35	0	35	0.684	0.743	22	3	8	0.487	0.500	0.987
030	1	1	4	6	0	6	0.052	0.333	12	4	4	0.147	0.033	0.180
034	16	2	6	24	0	24	0.474	0.750	11	3	8	0.183	0.083	0.266
035	3	4	28	35	0	35	0.184	0.200	8	3	6	0.117	0.167	0.284
041	13	0	8	21	0	21	0.342	0.619	14	4	5	0.189	0.250	0.439
119	0	3	12	15	0	15	0.078	0.200	15	4	10	0.172	0.250	0.422
219	3	0	16	19	0	19	0.078	0.158	17	4	8	0.192	0.066	0.258
319	1	0	4	5	0	5	0.026	0.200	7	2	5	0.073	0.033	0.106
419	18	2	7	27	0	27	0.526	0.741	14	3	9	0.103	0.083	0.186

Question No. 024
Database No. 191

****
* Summary of Search Results *
****

# Relevant abstracts : 1
# Partially relevant : 4
Total # Rel. or Part. rel. : 5
# Not relevant : 30
# Evaluated : 35
# Not evaluated : 0
Total # of references : 35
Overall precision : .142

User evaluation:

User's time : 1.25 hrs.
Dollar value assigned : $40.00
Worth assigned : 2
Problem resolution : 1
Satisfaction : 4

Searcher evaluation:

A: # Relevant
B: # Partially relevant
C: # Not relevant
D: Total # evaluated
E: # Not evaluated
F: Total # retrieved
G: Recall
H: Precision
I: Total # commands
J: Total # cycles
K: Total # search terms
L: Online connect time
M: Preparation time
N: Total time

SEAR	A	B	C	D	E	F	G	H	I	J	K	L	M	N
007	1	2	7	10	0	10	0.600	0.300	13	5	4	0.289	0.200	0.489
012	1	1	4	6	0	6	0.400	0.333	13	2	14	0.267	0.333	0.600
023	0	1	10	11	0	11	0.200	0.090	12	3	4	0.334	0.250	0.584
025	0	0	0	0	0	0	0.000	0.000	8	3	5	0.050	0.167	0.217
036	1	2	8	11	0	11	0.600	0.273	14	3	17	0.362	0.117	0.479
120	1	2	6	9	0	9	0.600	0.333	21	3	17	0.288	0.150	0.438
220	1	1	12	14	0	14	0.400	0.143	9	3	9	0.161	0.167	0.328
320	0	0	3	3	0	3	0.000	0.000	5	2	15	0.119	0.200	0.319
420	1	2	16	19	0	19	0.600	0.158	40	5	4	0.500	0.083	0.583

```
                                Question No. 025
                                Database No. 001

                      *******************************
                      *  Summary of Search Results  *
                      *******************************


                      # Relevant abstracts   :    30
                      # Partially relevant   :    26
                Total # Rel. or Part. rel.   :    56
                      # Not relevant         :    94
                      # Evaluated            :   150
                      # Not evaluated        :   430
                Total # of references        :   580
                      Overall precision      :  .373

                User evaluation:


                     User's time             : 2.00 hrs.
                     Dollar value assigned   : none
                     Worth assigned          :  3
                     Problem resolution      :  2
                     Satisfaction            :  2


                Searcher evaluation:


                     A: # Relevant             H: Precision
                     B: # Partially relevant   I: Total # commands
                     C: # Not relevant         J: Total # cycles
                     D: Total # evaluated      K: Total # search terms
                     E: # Not evaluated        L: Online connect time
                     F: Total # retrieved      M: Preparation time
                     G: Recall                 N: Total time


SEAR    A    B    C    D    E    F     G     H      I   J   K     L     M     N

002    16   15   19   50  199  249 0.554 0.620    22   5  19 0.359 0.333 0.692
014     3    2    6   11   48   59 0.089 0.455     6   2   5 0.094 0.117 0.211
016     0    0    3    3   33   36 0.000 0.000    17   2  12 0.511 0.750 1.261
021     1    0    0    1    6    7 0.017 1.000    12   3   8 0.175 0.333 0.508
033     0    0    0    0    1    1 0.000 0.000    15   5  16 0.224 0.083 0.307
119    12   17   54   83  112  195 0.518 0.349    12   4  16 0.254 0.250 0.504
219     0    0    1    1   18   19 0.000 0.000    13   3   9 0.167 0.167 0.334
319     3    1    6   10   29   39 0.071 0.400    10   2  13 0.174 0.167 0.341
419     1    0   14   15   35   50 0.017 0.066     9   2   7 0.091 0.250 0.341
```

Question No. 026
Database No. 038

****
* Summary of Search Results *
****

# Relevant abstracts : 37
# Partially relevant : 39
Total # Rel. or Part. rel. : 76
# Not relevant : 8
# Evaluated : 84
# Not evaluated : 0
Total # of references : 84
Overall precision : .904

User evaluation:

User's time : 0.83 hrs.
Dollar value assigned : none
Worth assigned : 5
Problem resolution : 4
Satisfaction : 5

Searcher evaluation:

A: # Relevant	H: Precision
B: # Partially relevant	I: Total # commands
C: # Not relevant	J: Total # cycles
D: Total # evaluated	K: Total # search terms
E: # Not evaluated	L: Online connect time
F: Total # retrieved	M: Preparation time
G: Recall	N: Total time

SEAR	A	B	C	D	E	F	G	H	I	J	K	L	M	N
012	1	0	0	1	0	1	0.013	1.000	9	3	5	0.208	0.333	0.541
015	0	0	3	3	0	3	0.000	0.000	19	3	15	0.255	0.250	0.505
023	8	19	0	27	0	27	0.355	1.000	13	3	11	0.218	0.417	0.635
025	9	2	0	11	0	11	0.145	1.000	4	1	2	0.036	0.333	0.369
036	1	1	0	2	0	2	0.026	1.000	8	2	9	0.195	0.300	0.495
119	1	4	5	10	0	10	0.065	0.500	7	2	9	0.055	0.250	0.305
219	29	25	0	54	0	54	0.711	1.000	9	3	8	0.099	0.083	0.182
319	1	0	0	1	0	1	0.013	1.000	11	2	27	0.152	0.167	0.319
419	7	1	0	8	0	8	0.105	1.000	12	4	6	0.113	0.200	0.313

```
                         Question No. 027
                         Database No. 013

               ********************************
               *  Summary of Search Results  *
               ********************************

               # Relevant abstracts   :   35
               # Partially relevant   :   69
         Total # Rel. or Part. rel.   :  104
               # Not relevant         :   46
               # Evaluated            :  150
               # Not evaluated        :   58
         Total # of references        :  208
               Overall precision      : .693

         User evaluation:

              User's time            : 12.00 hrs.
              Dollar value assigned  : none
              Worth assigned         :  3
              Problem resolution     :  4
              Satisfaction           :  3

         Searcher evaluation:

              A: # Relevant            H: Precision
              B: # Partially relevant  I: Total # commands
              C: # Not relevant        J: Total # cycles
              D: Total # evaluated     K: Total # search terms
              E: # Not evaluated       L: Online connect time
              F: Total # retrieved     M: Preparation time
              G: Recall                N: Total time

SEAR    A    B    C    D    E    F   G     H      I    J    K   L     M     N

005     7   11    1   19   12   31 0.173 0.947   14    2   22 0.311 0.167 0.478
011     7   19   13   39   15   54 0.250 0.667   39    7   11 0.499 0.250 0.749
027     8   12   11   31    7   38 0.192 0.645   11    1    7 0.157 0.083 0.240
025    22   39   32   93   34  127 0.587 0.656   11    3    5 0.133 0.083 0.216
040    19   14    2   35   12   47 0.317 0.943   23    6   10 0.362 0.066 0.428
120     2    0    0    2    1    3 0.019 1.000    4    2    3 0.108 0.083 0.191
220     6    7    7   20    4   24 0.125 0.650    7    1    9 0.162 0.016 0.178
320    22   38   32   92   34  126 0.577 0.652    4    1    8 0.185 0.033 0.218
420    19   15    3   37   11   48 0.327 0.919   25    2    4 0.348 0.033 0.381
```

```
                    Question No. 028
                    Database No. 038

          ********************************
          *  Summary of Search Results   *
          ********************************


          # Relevant abstracts   :    5
          # Partially relevant   :   23
    Total # Rel. or Part. rel.   :   28
          # Not relevant         :   39
          # Evaluated            :   67
          # Not evaluated        :    0
    Total # of references        :   67
          Overall precision      : .417


    User evaluation:


         User's time             : 0.17 hrs.
         Dollar value assigned : $10.00
         Worth assigned          :  3
         Problem resolution      :  2
         Satisfaction            :  3


    Searcher evaluation:


         A: # Relevant              H: Precision
         B: # Partially relevant    I: Total # commands
         C: # Not relevant          J: Total # cycles
         D: Total # evaluated       K: Total # search terms
         E: # Not evaluated         L: Online connect time
         F: Total # retrieved       M: Preparation time
         G: Recall                  N: Total time


SEAR   A    B    C    D    E    F  G      H         I    J    K  L     M     N

007    4   14   18   36    0   36 0.643 0.500    13    4    9 0.272 0.200 0.472
012    4    5    2   11    0   11 0.321 0.818     9    1    8 0.150 0.250 0.400
023    0    1    2    3    0    3 0.035 0.333     8    1    8 0.108 0.250 0.358
034    1    1   12   14    0   14 0.071 0.143    31    7    8 0.212 0.083 0.295
036    0    0    0    0    0    0 0.000 0.000    11    2   11 0.265 0.167 0.432
119    4   14    4   22    0   22 0.643 0.818    14    3   13 0.139 0.167 0.306
219    4    6    1   11    0   11 0.357 0.909     8    1    8 0.076 0.033 0.109
319    4    6    2   12    0   12 0.357 0.833     7    2    8 0.055 0.050 0.105
419    4    6    7   17    0   17 0.357 0.588    11    2   18 0.102 0.083 0.185
```

```
                              Question No. 029
                              Database No. 008

                    ******************************
                    *  Summary of Search Results  *
                    ******************************


                     # Relevant abstracts  :   36
                     # Partially relevant  :   34
               Total # Rel. or Part. rel.  :   70
                     # Not relevant        :   80
                     # Evaluated           :  150
                     # Not evaluated       :   77
               Total # of references       :  227
                     Overall precision     : .666


               User evaluation:


                    User's time            : 0.75 hrs.
                    Dollar value assigned  : $200.00
                    Worth assigned         :  5
                    Problem resolution     :  4
                    Satisfaction           :  4


               Searcher evaluation:


                    A: # Relevant            H: Precision
                    B: # Partially relevant  I: Total # commands
                    C: # Not relevant        J: Total # cycles
                    D: Total # evaluated     K: Total # search terms
                    E: # Not evaluated       L: Online connect time
                    F: Total # retrieved     M: Preparation time
                    G: Recall                N: Total time


SEAR    A    B    C    D    E    F   G      H        I     J     K  L      M      N

011     8    8   12   28   22   50 0.229 0.571     32     2    24 0.076 0.083 0.159
027    15   13   50   78   23  101 0.400 0.359     19     7    15 0.161 0.250 0.411
038     3    1    1    5    3    8 0.057 0.800     17     6     9 0.326 0.167 0.493
039     5    3    2   10    5   15 0.114 0.800     25     6     9 0.268 0.250 0.518
040     3    0    0    3    0    3 0.042 1.000     30     9    22 0.423 0.333 0.756
120    28   10   13   51   24   75 0.543 0.745      9     4     5 0.198 0.250 0.448
220     7    4    1   12    5   17 0.157 0.917      7     2    13 0.156 0.250 0.406
320    19    9   15   43   33   76 0.400 0.651     10     1    17 0.258 0.283 0.541
420     6    5    2   13    0   13 0.157 0.846     11     2    17 0.188 0.417 0.605
```

Question No. 030
Database No. 071

****
* Summary of Search Results *
****

# Relevant abstracts	57
# Partially relevant	25
Total # Rel. or Part. rel.	82
# Not relevant	13
# Evaluated	95
# Not evaluated	0
Total # of references	95
Overall precision	.863

User evaluation:

User's time	2.00 hrs.
Dollar value assigned	none
Worth assigned	5
Problem resolution	5
Satisfaction	5

Searcher evaluation:

A: # Relevant
B: # Partially relevant
C: # Not relevant
D: Total # evaluated
E: # Not evaluated
F: Total # retrieved
G: Recall
H: Precision
I: Total # commands
J: Total # cycles
K: Total # search terms
L: Online connect time
M: Preparation time
N: Total time

SEAR	A	B	C	D	E	F	G	H	I	J	K	L	M	N
007	7	1	2	10	0	10	0.097	0.800	14	4	10	0.283	0.066	0.349
012	29	14	5	48	0	48	0.524	0.896	12	1	10	0.183	0.250	0.433
023	37	14	5	56	0	56	0.622	0.911	11	3	6	0.183	0.333	0.516
025	2	0	0	2	0	2	0.024	1.000	9	1	5	0.218	0.250	0.468
036	1	0	0	1	0	1	0.012	1.000	11	3	15	0.257	0.483	0.740
120	32	16	5	53	0	53	0.585	0.906	7	2	4	0.056	0.167	0.223
220	32	15	5	52	0	52	0.573	0.904	9	2	14	0.177	0.183	0.360
320	0	3	2	5	0	5	0.036	0.600	11	2	30	0.220	0.250	0.470
420	49	16	2	67	0	67	0.793	0.970	29	2	2	0.161	0.066	0.227

```
                              Question No. 031
                              Database No. 061

                    ********************************
                    *  Summary of Search Results  *
                    ********************************


                # Relevant abstracts  :   14
                # Partially relevant  :   15
          Total # Rel. or Part. rel.  :   29
                # Not relevant        :   85
                # Evaluated           :  114
                # Not evaluated       :    0
          Total # of references       :  114
                  Overall precision   : .393

          User evaluation:


               User's time            : 0.50 hrs.
               Dollar value assigned  : $25.00
               Worth assigned         :  4
               Problem resolution     :  2
               Satisfaction           :  1

          Searcher evaluation:


               A: # Relevant             H: Precision
               B: # Partially relevant   I: Total # commands
               C: # Not relevant         J: Total # cycles
               D: Total # evaluated      K: Total # search terms
               E: # Not evaluated        L: Online connect time
               F: Total # retrieved      M: Preparation time
               G: Recall                 N: Total time


SEAR    A    B    C    D    E    F     G      H      I    J    K     L      M      N

007     1    0   19   20    0   20 0.034  0.050   11    3   13 0.448  0.100  0.548
012     6    6   34   46    0   46 0.414  0.261   10    3    4 0.141  0.167  0.308
023    10   12   41   63    0   63 0.759  0.349   32    6   28 1.124  0.750  1.874
025     5    4   18   27    0   27 0.310  0.333    7    2    3 0.050  0.250  0.300
036     3    0    8   11    0   11 0.103  0.273    4    2    4 0.104  0.233  0.337
120     7    5   23   35    0   35 0.414  0.343   15    5    6 0.199  0.167  0.366
220     1    1    7    9    0    9 0.069  0.222    6    2    5 0.096  0.083  0.179
320     3    0    3    6    0    6 0.103  0.500    9    1   17 0.122  0.083  0.205
420     4    2    3    9    0    9 0.207  0.667   29    3    0 0.307  0.083  0.390
```

Question No. 032
Database No. 008

```
*******************************
*  Summary of Search Results  *
*******************************

      # Relevant abstracts  :  113
      # Partially relevant  :   19
Total # Rel. or Part. rel.  :  132
      # Not relevant        :   18
      # Evaluated           :  150
      # Not evaluated       :  298
Total # of references       :  448
      Overall precision     : .880
```

User evaluation:

User's time : 2.00 hrs.
Dollar value assigned : $200.00
Worth assigned : 5
Problem resolution : 5
Satisfaction : 5

Searcher evaluation:

A: # Relevant
B: # Partially relevant
C: # Not relevant
D: Total # evaluated
E: # Not evaluated
F: Total # retrieved
G: Recall
H: Precision
I: Total # commands
J: Total # cycles
K: Total # search terms
L: Online connect time
M: Preparation time
N: Total time

SEAR	A	B	C	D	E	F	G	H	I	J	K	L	M	N
001	6	0	0	6	0	6	0.045	1.000	14	2	7	0.274	0.333	0.607
008	42	3	0	45	74	119	0.341	1.000	31	12	31	0.633	0.333	0.966
017	0	1	17	18	0	18	0.007	0.055	9	3	9	0.092	0.167	0.259
029	34	4	0	38	112	150	0.288	1.000	24	10	6	0.744	0.667	1.411
032	58	2	0	60	119	179	0.455	1.000	7	3	6	0.163	0.083	0.246
119	49	5	1	55	137	192	0.409	0.982	8	2	7	0.151	0.250	0.401
219	50	5	1	56	142	198	0.417	0.982	13	2	10	0.131	0.250	0.381
319	1	0	0	1	9	10	0.007	1.000	10	2	17	0.112	0.083	0.195
419	86	13	0	99	195	294	0.750	1.000	5	2	3	0.085	0.050	0.135

```
                         Question No. 033
                         Database No. 008

             *******************************
             *  Summary of Search Results  *
             *******************************

            # Relevant abstracts  :   44
            # Partially relevant  :   57
      Total # Rel. or Part. rel.  :  101
            # Not relevant        :   49
            # Evaluated           :  150
            # Not evaluated       :  123
      Total # of references       :  273
            Overall precision     : .673

      User evaluation:

           User's time            : 3.00 hrs.
           Dollar value assigned  : $1000.00
           Worth assigned         :  5
           Problem resolution     :  4
           Satisfaction           :  4

      Searcher evaluation:

           A: # Relevant           H: Precision
           B: # Partially relevant I: Total # commands
           C: # Not relevant       J: Total # cycles
           D: Total # evaluated    K: Total # search terms
           E: # Not evaluated      L: Online connect time
           F: Total # retrieved    M: Preparation time
           G: Recall               N: Total time


SEAR    A    B    C    D    E    F  G      H         I    J    K  L     M     N

001     0    0    0    0    0    0 0.000 0.000      22    5   10 0.675 0.833 1.508
008     0    0    3    3    2    5 0.000 0.000      16    4   39 0.450 0.250 0.700
017     3    0    0    3    4    7 0.029 1.000      17    4    6 0.324 0.667 0.991
029     1    0    0    1    1    2 0.009 1.000       8    2    3 0.192 0.417 0.609
032    15   26    6   47   38   85 0.406 0.872      13    4    6 0.217 0.083 0.300
119    20   12   15   47   24   71 0.317 0.681      20    6    9 0.270 0.333 0.603
219     7   17   12   36   41   77 0.238 0.667      15    5   11 0.300 0.167 0.467
319     4    6    4   14   14   28 0.099 0.714      10    3   10 0.143 0.250 0.393
419     6    6   11   23   15   38 0.119 0.522      11    2    7 0.196 0.167 0.363
```

```
                         Question No. 034
                         Database No. 013

              ******************************
              *  Summary of Search Results  *
              ******************************


               # Relevant abstracts  :   10
               # Partially relevant  :   39
         Total # Rel. or Part. rel.  :   49
               # Not relevant        :  100
               # Evaluated           :  149
               # Not evaluated       :  207
         Total # of references       :  356
               Overall precision     : .328

         User evaluation:


              User's time            : 3.00 hrs.
              Dollar value assigned  : $150.00
              Worth assigned         :  4
              Problem resolution     :  3
              Satisfaction           :  4

         Searcher evaluation:


              A: # Relevant              H: Precision
              B: # Partially relevant    I: Total # commands
              C: # Not relevant          J: Total # cycles
              D: Total # evaluated       K: Total # search terms
              E: # Not evaluated         L: Online connect time
              F: Total # retrieved       M: Preparation time
              G: Recall                  N: Total time


SEAR    A    B    C    D    E    F   G      H        I    J    K   L     M     N

001     1    2    0    3    0    3 0.061 1.000     12    2    7 0.278 0.583 0.861
008     4   12   70   86  186  272 0.327 0.186     15    6    8 0.426 0.133 0.559
017     0    4    5    9    1   10 0.081 0.444     15    5    6 0.333 0.333 0.666
029     1   13    7   21    0   21 0.286 0.667      5    2    5 0.069 0.417 0.486
032     0    1    0    1    0    1 0.020 1.000     12    5    6 0.211 0.083 0.294
119     3    7   14   24   10   34 0.204 0.417      5    1    3 0.167 0.250 0.417
219     0    1    3    4    7   11 0.020 0.250     13    2    7 0.293 0.083 0.376
319     2    5   10   17    8   25 0.143 0.412     13    2   10 0.203 0.066 0.269
419     0    0    4    4    9   13 0.000 0.000      9    2    7 0.288 0.083 0.371
```

```
                              Question No. 035
                              Database No. 154

                    ****************************
                    *  Summary of Search Results  *
                    ****************************


                 # Relevant abstracts  :   31
                 # Partially relevant  :   20
           Total # Rel. or Part. rel.  :   51
                 # Not relevant        :   14
                 # Evaluated           :   65
                 # Not evaluated       :    0
           Total # of references       :   65
                 Overall precision     : .784

           User evaluation:


                User's time             : 1.50 hrs.
                Dollar value assigned   : $25.00
                Worth assigned          :  5
                Problem resolution      :  4
                Satisfaction            :  4

           Searcher evaluation:


                A: # Relevant             H: Precision
                B: # Partially relevant   I: Total # commands
                C: # Not relevant         J: Total #.cycles
                D: Total # evaluated      K: Total # search terms
                E: # Not evaluated        L: Online connect time
                F: Total # retrieved      M: Preparation time
                G: Recall                 N: Total time


SEAR    A    B    C    D    E    F   G     H      I    J    K   L     M     N

001     1    0    0    1    0    1 0.019 1.000   16    5    4 0.445 0.333 0.778
008     6    5    5   16    0   16 0.216 0.688   22    6   20 0.361 0.200 0.561
017     1    0    0    1    0    1 0.019 1.000    6    1    3 0.080 0.083 0.163
029    12    4    6   22    0   22 0.314 0.727   14    3   10 0.219 0.250 0.469
032     9   10    3   22    0   22 0.373 0.864   15    5    6 0.184 0.083 0.267
120     4    1    0    5    0    5 0.098 1.000    7    3    5 0.132 0.133 0.265
220     4    1    0    5    0    5 0.098 1.000    7    2    4 0.127 0.167 0.294
320    14    6    0   20    0   20 0.392 1.000   19    6   22 0.556 0.117 0.673
420     4    2    1    7    0    7 0.118 0.857    7    1    4 0.095 0.167 0.262
```

```
                         Question No. 036
                         Database No. 090

                ******************************
                *  Summary of Search Results *
                ******************************

                #  Relevant abstracts   :   62
                #  Partially relevant   :   49
          Total #  Rel. or Part. rel.   :  111
                #  Not relevant         :   39
                #  Evaluated            :  150
                #  Not evaluated        :   57
          Total #  of references        :  207
                   Overall precision    : .740

          User evaluation:

               User's time            : 2.00 hrs.
               Dollar value assigned  : $50.00
               Worth assigned         :  4
               Problem resolution     :  3
               Satisfaction           :  4

          Searcher evaluation:

               A: # Relevant            H: Precision
               B: # Partially relevant  I: Total # commands
               C: # Not relevant        J: Total # cycles
               D: Total # evaluated     K: Total # search terms
               E: # Not evaluated       L: Online connect time
               F: Total # retrieved     M: Preparation time
               G: Recall                N: Total time

SEAR   A    B    C    D    E    F   G      H       I    J    K  L     M     N

007   13   13   11   37   36   73 0.234 0.703   20    7   13 0.341 0.167 0.508
012    5    2    5   12    0   12 0.063 0.583   13    2   13 0.213 0.417 0.630
023   20   17   13   50   12   62 0.333 0.740   23    5   12 0.597 0.583 1.180
025   31   13   12   56    0   56 0.396 0.786    9    1    8 0.111 0.250 0.361
036   28    9   10   47    0   47 0.333 0.787    7    2    4 0.157 0.083 0.240
120    6    9    1   16    9   25 0.135 0.938   10    3   15 0.153 0.117 0.270
220    4    2    0    6    0    6 0.054 1.000    6    1   14 0.126 0.117 0.243
320    7    3    1   11    2   13 0.090 0.909    7    1    9 0.081 0.083 0.164
420    4    1    0    5    0    5 0.045 1.000   28    2    1 0.200 0.083 0.283
```

Question No. 037
Database No. 016

****
* Summary of Search Results *
****

	# Relevant abstracts	78
	# Partially relevant	18
Total	# Rel. or Part. rel.	96
	# Not relevant	54
	# Evaluated	150
	# Not evaluated	69
Total	# of references	219
	Overall precision	.640

User evaluation:

User's time	3.00 hrs.
Dollar value assigned	$300.00
Worth assigned	5
Problem resolution	4
Satisfaction	5

Searcher evaluation:

A: # Relevant
B: # Partially relevant
C: # Not relevant
D: Total # evaluated
E: # Not evaluated
F: Total # retrieved
G: Recall
H: Precision
I: Total # commands
J: Total # cycles
K: Total # search terms
L: Online connect time
M: Preparation time
N: Total time

SEAR	A	B	C	D	E	F	G	H	I	J	K	L	M	N
015	11	3	33	47	25	72	0.146	0.298	26	5	7	0.733	0.500	1.233
030	3	0	2	5	0	5	0.031	0.600	39	9	17	0.869	0.333	1.202
034	16	1	6	23	2	25	0.177	0.739	25	4	7	0.220	0.167	0.387
035	29	1	6	36	19	55	0.313	0.833	17	5	9	0.252	0.083	0.335
041	31	6	10	47	26	73	0.385	0.787	13	4	7	0.198	0.167	0.365
119	20	2	0	22	0	22	0.229	1.000	16	3	9	0.158	0.133	0.291
219	19	1	1	21	0	21	0.208	0.952	11	3	9	0.148	0.033	0.181
319	18	1	1	20	0	20	0.198	0.950	13	4	8	0.133	0.016	0.149
419	34	10	5	49	0	49	0.458	0.898	29	5	11	0.490	0.250	0.740

Question No. 038
Database No. 061

****
* Summary of Search Results *
****

# Relevant abstracts : 79
# Partially relevant : 29
Total # Rel. or Part. rel. : 108
# Not relevant : 42
# Evaluated : 150
# Not evaluated : 595
Total # of references : 745
Overall precision : .720

User evaluation:

User's time : 4.00 hrs.
Dollar value assigned : none
Worth assigned : 5
Problem resolution : 5
Satisfaction : 5

Searcher evaluation:

A: # Relevant	H: Precision
B: # Partially relevant	I: Total # commands
C: # Not relevant	J: Total # cycles
D: Total # evaluated	K: Total # search terms
E: # Not evaluated	L: Online connect time
F: Total # retrieved	M: Preparation time
G: Recall	N: Total time

SEAR	A	B	C	D	E	F	G	H	I	J	K	L	M	N
015	8	5	3	16	53	69	0.120	0.813	24	3	16	0.361	0.500	0.861
030	6	9	19	34	240	274	0.139	0.441	20	5	10	0.312	0.417	0.729
034	8	1	4	13	32	45	0.083	0.692	32	6	4	0.303	0.083	0.386
035	6	2	2	10	15	25	0.074	0.800	19	4	13	0.278	0.083	0.361
041	29	8	3	40	64	104	0.343	0.925	45	14	17	0.857	0.417	1.274
120	5	1	1	7	30	37	0.055	0.857	24	7	14	0.469	0.267	0.736
220	8	2	2	12	71	83	0.092	0.833	30	7	31	0.352	0.250	0.602
320	3	2	4	9	37	46	0.046	0.556	23	5	49	0.455	0.167	0.622
420	11	0	4	15	79	94	0.102	0.733	50	7	4	0.811	0.083	0.894

```
                    Question No. 039
                    Database No. 015

          ********************************
          *  Summary of Search Results  *
          ********************************

           # Relevant abstracts  :   26
           # Partially relevant  :   38
     Total # Rel. or Part. rel.  :   64
           # Not relevant        :  102
           # Evaluated           :  166
           # Not evaluated       :    0
     Total # of references       :  166
           Overall precision     : .386

     User evaluation:

          User's time             : 2.50 hrs.
          Dollar value assigned   : $100.00
          Worth assigned          :  4
          Problem resolution      :  4
          Satisfaction            :  4

     Searcher evaluation:

          A: # Relevant           H: Precision
          B: # Partially relevant I: Total # commands
          C: # Not relevant       J: Total # cycles
          D: Total # evaluated    K: Total # search terms
          E: # Not evaluated      L: Online connect time
          F: Total # retrieved    M: Preparation time
          G: Recall               N: Total time

SEAR   A    B    C    D    E    F  G     H        I    J    K  L     M     N

015    0    0    0    0    0    0 0.000 0.000    10    3   10 0.166 0.500 0.666
030    4    3    7   14    0   14 0.109 0.500    13    3   12 0.291 0.583 0.874
034    2    5    5   12    0   12 0.109 0.583    17    4    7 0.183 0.083 0.266
035    0    0    6    6    0    6 0.000 0.000    16    5   12 0.317 0.333 0.650
041    1    0    1    2    0    2 0.015 0.500    19    4    7 0.285 0.417 0.702
119    0    0    4    4    0    4 0.000 0.000    18    4    9 0.173 0.167 0.340
219   15    6    6   27    0   27 0.328 0.778    13    4    7 0.096 0.083 0.179
319    5   22   56   83    0   83 0.422 0.325    10    1   19 0.192 0.117 0.309
419    6    6   26   38    0   38 0.188 0.316     6    1    5 0.082 0.333 0.415
```

```
                 Question No. 040
                 Database No. 016

          ********************************
          *  Summary of Search Results  *
          ********************************


       # Relevant abstracts  :   77
       # Partially relevant  :   40
 Total # Rel. or Part. rel.  :  117
       # Not relevant        :   32
       # Evaluated           :  149
       # Not evaluated       :  331
 Total # of references       :  480
       Overall precision     : .785

User evaluation:

     User's time            : 4.00 hrs.
     Dollar value assigned  : $400.00
     Worth assigned         :  4
     Problem resolution     :  4
     Satisfaction           :  4

Searcher evaluation:

     A: # Relevant            H: Precision
     B: # Partially relevant  I: Total # commands
     C: # Not relevant        J: Total # cycles
     D: Total # evaluated     K: Total # search terms
     E: # Not evaluated       L: Online connect time
     F: Total # retrieved     M: Preparation time
     G: Recall                N: Total time


SEAR   A    B    C    D    E    F     G     H      I    J    K     L     M     N

015   10    6    0   16   61   77 0.137 1.000    32    9    8 0.443 0.250 0.693
030    2    4   32   38    4   42 0.051 0.158    13    3   15 0.293 0.500 0.793
034    6    2    0    8    7   15 0.068 1.000    32    8   10 0.367 0.250 0.617
035   11    4    0   15   47   62 0.128 1.000    14    6    6 0.257 0.083 0.340
041   16    9    0   25   18   43 0.214 1.000    19    7    3 0.321 0.333 0.654
120    8    2    0   10   20   30 0.085 1.000    17    5    5 0.303 0.500 0.803
220   12    9    0   21   52   73 0.179 1.000    20    5   20 0.384 0.167 0.551
320   38   12    0   50  189  239 0.427 1.000    29    7   31 0.398 0.250 0.648
420    3    0    0    3    4    7 0.025 1.000     9    2    3 0.143 0.333 0.476
```

APPENDIX C. SUMMARY OF SEARCH RESULTS OBTAINED BY OUTSIDE SEARCHERS

Appendix C contains identical information as part of the information presented in Appendix B (combined search results for the questions and search results itemized by the five outside searches) except that this time the data are compiled by searcher number instead of by question number. Each consecutive page lists in searcher number order results for that individual searcher. Within the compilation for each searcher are lited in number order the questions seached by that searcher. Appendix C includes the following:

1. Searcher number of the 36 outside searchers coded as 001 - 017, 021, and 023 - 041.

2. Question number and database number of the questions assigned to that individual searcher. The first three digits are the question number and the second three digits are the database number.

3. The combined results of all nine searches for each question done by the searcher including:

   A. Total number of relevant items
   B. Total number of partially relevant items
   C. Total number of not relevant items
   D. Total number of evaluated items
   E. Total number of not evaluated items, and
   F. Total number of retrieved items

4. Individual search results for that question including:

   A. Number of relevant items obtained by searcher number ___
   B. Number of partially relevant items obtained by searcher number ___
   C. Number of not relevant items obtained by searcher number ___
   D. Number of items retrieved by searcher number ___ which were evaluated
   E. Number of items retrieved by searcher number ___ which were not evaluated
   F. Total number of items retrieved by searcher number ___

5. The effectiveness measures for that question including:

   A. Search recall
   B. Search precision
   C. Number of search terms used by searcher number ___
   D. Number of commands used by searcher number ___
   E. Number of cycles used by searcher number ___
   F. Online connect time used by searcher number ___
   G. Offline preparation time used by searcher number ___
   H. Total search time used by searher number ___

```
                              Searcher No. 001

QUEST-DBASE    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #
  NUMBER        RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

  032008        113         19         18        150        298        448

                    # of relevant items    :   6
                    # of partially relv    :   0
                    #  of  not relevant    :   0
                    ----------------------------
                    total # evaluated      :   6
                    #  not evaluated       :   0
                    -----------------------------
                    total # retrieved      :   6

                           recall          : 0.045
                          precision        : 1.000

                    total # of search terms:   7
                    total # of commands    :  14
                    total # of cycles      :   2

                    on-line connect time   : 0.274
                    off preparation time   : 0.333
                    -----------------------------
                    total searching time   : 0.607


  033008         44         57         49        150        123        273

                    # of relevant items    :   0
                    # of partially relv    :   0
                    #  of  not relevant    :   0
                    ----------------------------
                    total # evaluated      :   0
                    #  not evaluated       :   0
                    -----------------------------
                    total # retrieved      :   0

                           recall          : 0.000
                          precision        : 0.000

                    total # of search terms:  10
                    total # of commands    :  22
                    total # of cycles      :   5

                    on-line connect time   : 0.675
                    off preparation time   : 0.833
                    -----------------------------
                    total searching time   : 1.508
```

```
                              Searcher No. 001

QUEST-DBASE     TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #
  NUMBER          RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

  019075           27         49         74        150         52         202


                    # of relevant items    :   0
                    # of partially relv    :   0
                    #  of  not relevant    :   1
                    ----------------------------
                    total # evaluated      :   1
                    #  not evaluated       :   1
                    -----------------------------
                    total # retrieved      :   2

                           recall          : 0.000
                          precision        : 0.000

                    total # of search terms:   8
                    total # of commands    :  16
                    total # of cycles      :   2

                    on-line connect time   : 0.305
                    off preparation time   : 0.417
                    -----------------------------
                    total searching time   : 0.722


  020015           26         43         81        150        161         311


                    # of relevant items    :   0
                    # of partially relv    :   1
                    #  of  not relevant    :   1
                    ----------------------------
                    total # evaluated      :   2
                    #  not evaluated       :   2
                    -----------------------------
                    total # retrieved      :   4

                           recall          : 0.014
                          precision        : 0.500

                    total # of search terms:   4
                    total # of commands    :  13
                    total # of cycles      :   2

                    on-line connect time   : 0.239
                    off preparation time   : 0.333
                    -----------------------------
                    total searching time   : 0.572
```

```
                              Searcher No. 001

QUEST-DBASE    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #     TOTAL #
  NUMBER        RELV       PREL       NREL       EVAL       NEVL      RETRIEVED

  034013         10         39        100        149        207         356


                    # of relevant items    :   1
                    # of partially relv    :   2
                    #  of  not relevant    :   0
                    -----------------------------
                     total # evaluated      :   3
                    #  not evaluated       :   0
                    ------------------------------
                    total # retrieved      :   3

                          recall           : 0.061
                         precision         : 1.000

                    total # of search terms:   7
                    total # of commands    :  12
                    total # of cycles      :   2

                    on-line connect time   : 0.278
                    off preparation time   : 0.583
                    ------------------------------
                    total searching time   : 0.861


  035154         31         20         14         65          0          65


                    # of relevant items    :   1
                    # of partially relv    :   0
                    #  of  not relevant    :   0
                    -----------------------------
                    total # evaluated      :   1
                    #  not evaluated       :   0
                    ------------------------------
                    total # retrieved      :   1

                          recall           : 0.019
                         precision         : 1.000

                    total # of search terms:   4
                    total # of commands    :  16
                    total # of cycles      :   5

                    on-line connect time   : 0.445
                    off preparation time   : 0.333
                    ------------------------------
                    total searching time   : 0.778
```

```
                              Searcher No. 002

QUEST-DBASE    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #
  NUMBER         RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

  001011          27         46         75        148        626        774


                       # of relevant items    :   3
                       # of partially relv    :   2
                       #  of  not relevant    :   1
                       ----------------------------
                       total # evaluated      :   6
                       #  not evaluated       :   9
                       -----------------------------
                       total # retrieved      :  15

                              recall          : 0.068
                             precision        : 0.833

                       total # of search terms:  13
                       total # of commands    :  21
                       total # of cycles      :   5

                       on-line connect time   : 0.167
                       off preparation time   : 0.250
                       -----------------------------
                       total searching time   : 0.417


  003064          36         47         68        151        272        423


                       # of relevant items    :   9
                       # of partially relv    :  18
                       #  of  not relevant    :  26
                       ----------------------------
                       total # evaluated      :  53
                       #  not evaluated       :  10
                       -----------------------------
                       total # retrieved      :  63

                              recall          : 0.325
                             precision        : 0.509

                       total # of search terms:  13
                       total # of commands    :  14
                       total # of cycles      :   5

                       on-line connect time   : 0.167
                       off preparation time   : 0.250
                       -----------------------------
                       total searching time   : 0.417
```

```
                         Searcher No. 002

QUEST-DBASE   TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #
  NUMBER       RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

  009037        18         48         84        150        495        645

                    # of relevant items    :   1
                    # of partially relv    :   6
                    #  of  not relevant    :   2
                    ----------------------------
                    total # evaluated      :   9
                    #  not evaluated       :  45
                    -----------------------------
                    total # retrieved      :  54

                           recall          : 0.106
                          precision        : 0.778

                    total # of search terms:  18
                    total # of commands    :  24
                    total # of cycles      :   6

                    on-line connect time   : 0.273
                    off preparation time   : 0.250
                    -----------------------------
                    total searching time   : 0.523


  016011        25         37        108        170          0        170

                    # of relevant items    :  20
                    # of partially relv    :  21
                    #  of  not relevant    :  30
                    ----------------------------
                    total # evaluated      :  71
                    #  not evaluated       :   0
                    -----------------------------
                    total # retrieved      :  71

                           recall          : 0.661
                          precision        : 0.577

                    total # of search terms:   3
                    total # of commands    :   6
                    total # of cycles      :   2

                    on-line connect time   : 0.058
                    off preparation time   : 0.167
                    -----------------------------
                    total searching time   : 0.225
```

```
                         Searcher No. 002

QUEST-DBASE    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #
  NUMBER        RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

  021037          19          6         77        102          0        102

                 # of relevant items    :   6
                 # of partially relv    :   0
                 #  of  not relevant    :   9
                 ----------------------------
                 total # evaluated      :  15
                 #  not evaluated       :   0
                 -----------------------------
                 total # retrieved      :  15

                       recall           : 0.240
                      precision         : 0.400

                 total # of search terms:  30
                 total # of commands    :  30
                 total # of cycles      :   7

                 on-line connect time   : 0.387
                 off preparation time   : 0.250
                 -----------------------------
                 total searching time   : 0.637


  025001          30         26         94        150        430        580

                 # of relevant items    :  16
                 # of partially relv    :  15
                 #  of  not relevant    :  19
                 ----------------------------
                 total # evaluated      :  50
                 #  not evaluated       : 199
                 -----------------------------
                 total # retrieved      : 249

                       recall           : 0.554
                      precision         : 0.620

                 total # of search terms:  19
                 total # of commands    :  22
                 total # of cycles      :   5

                 on-line connect time   : 0.359
                 off preparation time   : 0.333
                 -----------------------------
                 total searching time   : 0.692
```

```
                          Searcher No. 003

QUEST-DBASE    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #
  NUMBER        RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

  002218         37         36        156        229          0         229


                 # of relevant items    :   5
                 # of partially relv    :   5
                 #  of  not relevant    :  12
                 ----------------------------
                 total # evaluated      :  22
                 #  not evaluated       :   0
                 -----------------------------
                 total # retrieved      :  22

                        recall          : 0.137
                       precision        : 0.455

                 total # of search terms:   8
                 total # of commands    :  13
                 total # of cycles      :   4

                 on-line connect time   : 0.173
                 off preparation time   : 0.333
                 -----------------------------
                 total searching time   : 0.506


  005148         16         23         48         87          1          88


                 # of relevant items    :   7
                 # of partially relv    :  15
                 #  of  not relevant    :  11
                 ----------------------------
                 total # evaluated      :  33
                 #  not evaluated       :   0
                 -----------------------------
                 total # retrieved      :  33

                        recall          : 0.564
                       precision        : 0.667

                 total # of search terms:   4
                 total # of commands    :  10
                 total # of cycles      :   4

                 on-line connect time   : 0.123
                 off preparation time   : 0.167
                 -----------------------------
                 total searching time   : 0.290
```

```
                              Searcher No. 003

QUEST-DBASE   TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #
  NUMBER       RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

  007075        70         39         40        149        336        485

                    # of relevant items    :   1
                    # of partially relv    :   3
                    #  of  not relevant    :   1
                    ----------------------------
                    total # evaluated      :   5
                    #  not evaluated       :   0
                    ------------------------------
                    total # retrieved      :   5

                           recall          : 0.036
                          precision        : 0.800

                    total # of search terms:   8
                    total # of commands    :   8
                    total # of cycles      :   2

                    on-line connect time   : 0.108
                    off preparation time   : 0.250
                    ------------------------------
                    total searching time   : 0.358


  013015         7         36        106        149         14        163

                    # of relevant items    :   3
                    # of partially relv    :   5
                    #  of  not relevant    :  22
                    ----------------------------
                    total # evaluated      :  30
                    #  not evaluated       :   3
                    ------------------------------
                    total # retrieved      :  33

                           recall          : 0.186
                          precision        : 0.267

                    total # of search terms:  18
                    total # of commands    :  29
                    total # of cycles      :   6

                    on-line connect time   : 0.404
                    off preparation time   : 0.417
                    ------------------------------
                    total searching time   : 0.821
```

```
                         Searcher No. 003

QUEST-DBASE    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #
  NUMBER         RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

  014151          35         71         51        157          2         159


                    # of relevant items    :  16
                    # of partially relv    :  26
                    #  of  not relevant    :   9
                    ----------------------------
                    total # evaluated      :  51
                    #  not evaluated       :   1
                    -----------------------------
                    total # retrieved      :  52

                           recall          : 0.396
                         precision         : 0.824

                    total # of search terms:  11
                    total # of commands    :  15
                    total # of cycles      :   2

                    on-line connect time   : 0.314
                    off preparation time   : 0.583
                    -----------------------------
                    total searching time   : 0.897


  018015          66         38         46        150        613         763


                    # of relevant items    :   0
                    # of partially relv    :   0
                    #  of  not relevant    :   0
                    ----------------------------
                    total # evaluated      :   0
                    #  not evaluated       :   1
                    -----------------------------
                    total # retrieved      :   1

                           recall          : 0.000
                         precision         : 0.000

                    total # of search terms:  24
                    total # of commands    :  28
                    total # of cycles      :   7

                    on-line connect time   : 0.438
                    off preparation time   : 0.333
                    -----------------------------
                    total searching time   : 0.771
```

```
                              Searcher No. 004

QUEST-DBASE    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #     TOTAL #
  NUMBER         RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

  002218          37         36        156        229          0          229


                   # of relevant items    :   0
                   # of partially relv    :   0
                   #  of  not relevant    :   2
                   ----------------------------
                   total # evaluated      :   2
                   #  not evaluated       :   0
                   -----------------------------
                   total # retrieved      :   2

                         recall           : 0.000
                        precision         : 0.000

                   total # of search terms:  15
                   total # of commands    :  18
                   total # of cycles      :   3

                   on-line connect time   : 0.148
                   off preparation time   : 0.100
                   -----------------------------
                   total searching time   : 0.248


  005148          16         23         48         87          1           88


                   # of relevant items    :   1
                   # of partially relv    :   2
                   #  of  not relevant    :   4
                   ----------------------------
                   total # evaluated      :   7
                   #  not evaluated       :   0
                   -----------------------------
                   total # retrieved      :   7

                         recall           : 0.076
                        precision         : 0.429

                   total # of search terms:   4
                   total # of commands    :  11
                   total # of cycles      :   3

                   on-line connect time   : 0.202
                   off preparation time   : 0.083
                   -----------------------------
                   total searching time   : 0.285
```

```
                           Searcher No. 004

QUEST-DBASE     TOTAL #     TOTAL #    TOTAL #    TOTAL #    TOTAL #     TOTAL #
  NUMBER         RELV        PREL       NREL       EVAL       NEVL      RETRIEVED

  007075           70          39         40        149        336          485


                  # of relevant items    :  16
                  # of partially relv    :  23
                  #  of  not relevant    :  28
                  ----------------------------
                  total # evaluated      :  67
                  #  not evaluated       : 278
                  -----------------------------
                  total # retrieved      : 345

                         recall          : 0.358
                        precision        : 0.582

                  total # of search terms:  14
                  total # of commands    :  24
                  total # of cycles      :   6

                  on-line connect time   : 0.441
                  off preparation time   : 0.167
                  -----------------------------
                  total searching time   : 0.608


  013015            7          36        106        149         14          163

                  # of relevant items    :   1
                  # of partially relv    :   1
                  #  of  not relevant    :   0
                  ----------------------------
                  total # evaluated      :   2
                  #  not evaluated       :   0
                  -----------------------------
                  total # retrieved      :   2

                         recall          : 0.046
                        precision        : 1.000

                  total # of search terms:  11
                  total # of commands    :  17
                  total # of cycles      :   3

                  on-line connect time   : 0.158
                  off preparation time   : 0.150
                  -----------------------------
                  total searching time   : 0.308
```

```
                              Searcher No. 004

QUEST-DBASE     TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #     TOTAL #
  NUMBER          RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

  014151           35         71         51        157          2         159


                    # of relevant items    :  10
                    # of partially relv    :  15
                    #  of  not relevant    :   5
                    ----------------------------
                    total # evaluated      :  30
                    #  not evaluated       :   1
                    -----------------------------
                    total # retrieved      :  31

                          recall           : 0.236
                         precision         : 0.833

                    total # of search terms:  11
                    total # of commands    :  18
                    total # of cycles      :   2

                    on-line connect time   : 0.248
                    off preparation time   : 0.233
                    -----------------------------
                    total searching time   : 0.481


  018015           66         38         46        150        613         763


                    # of relevant items    :  55
                    # of partially relv    :  29
                    #  of  not relevant    :  31
                    ----------------------------
                    total # evaluated      : 115
                    #  not evaluated       : 541
                    -----------------------------
                    total # retrieved      : 656

                          recall           : 0.808
                         precision         : 0.730

                    total # of search terms:  26
                    total # of commands    :  29
                    total # of cycles      :   5

                    on-line connect time   : 0.497
                    off preparation time   : 0.250
                    -----------------------------
                    total searching time   : 0.747
```

```
                         Searcher No. 005
QUEST-DBASE   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #    TOTAL #
  NUMBER        RELV      PREL      NREL      EVAL      NEVL    RETRIEVED

  001011         27        46        75       148       626       774


                 # of relevant items    :   7
                 # of partially relv    :   2
                 #  of  not relevant    :   0
                 ----------------------------
                 total # evaluated      :   9
                 #  not evaluated       :  11
                 -----------------------------
                 total # retrieved      :  20

                        recall          : 0.123
                      precision         : 1.000

                 total # of search terms:  12
                 total # of commands    :  22
                 total # of cycles      :   6

                 on-line connect time   : 0.370
                 off preparation time   : 0.117
                 -----------------------------
                 total searching time   : 0.487


  012013          6        21       121       148        90       238


                 # of relevant items    :   0
                 # of partially relv    :   3
                 #  of  not relevant    :  30
                 ----------------------------
                 total # evaluated      :  33
                 #  not evaluated       :  17
                 -----------------------------
                 total # retrieved      :  50

                        recall          : 0.111
                      precision         : 0.090

                 total # of search terms:  19
                 total # of commands    :  17
                 total # of cycles      :   4

                 on-line connect time   : 0.420
                 off preparation time   : 0.250
                 -----------------------------
                 total searching time   : 0.670
```

```
                          Searcher No. 005

QUEST-DBASE   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #
  NUMBER        RELV      PREL      NREL      EVAL      NEVL    RETRIEVED

  016011         25        37       108       170         0        170

                  # of relevant items    :   2
                  # of partially relv    :   3
                  #  of  not relevant    :   3
                  ----------------------------
                  total # evaluated      :   8
                  #  not evaluated       :   0
                  -----------------------------
                  total # retrieved      :   8

                       recall            : 0.080
                      precision          : 0.625

                  total # of search terms:  13
                  total # of commands    :  11
                  total # of cycles      :   3

                  on-line connect time   : 0.154
                  off preparation time   : 0.117
                  -----------------------------
                  total searching time   : 0.271


  019075         27        49        74       150        52        202

                  # of relevant items    :   4
                  # of partially relv    :   5
                  #  of  not relevant    :   3
                  -----------------------------
                  total # evaluated      :  12
                  #  not evaluated       :   1
                  -----------------------------
                  total # retrieved      :  13

                       recall            : 0.118
                      precision          : 0.750

                  total # of search terms:   9
                  total # of commands    :  10
                  total # of cycles      :   4

                  on-line connect time   : 0.189
                  off preparation time   : 0.133
                  -----------------------------
                  total searching time   : 0.322
```

```
                      Searcher No. 005

QUEST-DBASE   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #    TOTAL #
  NUMBER        RELV      PREL      NREL      EVAL      NEVL    RETRIEVED

  020015         26        43        81       150       161       311


                # of relevant items    :   1
                # of partially relv    :   0
                #  of  not relevant    :   3
                ----------------------------
                total # evaluated      :   4
                #  not evaluated       :   5
                -----------------------------
                total # retrieved      :   9

                      recall           : 0.014
                     precision         : 0.250

                total # of search terms:  15
                total # of commands    :  17
                total # of cycles      :   6

                on-line connect time   : 0.346
                off preparation time   : 0.133
                -----------------------------
                total searching time   : 0.479


  027013         35        69        46       150        58       208


                # of relevant items    :   7
                # of partially relv    :  11
                #  of  not relevant    :   1
                ----------------------------
                total # evaluated      :  19
                #  not evaluated       :  12
                -----------------------------
                total # retrieved      :  31

                      recall           : 0.173
                     precision         : 0.947

                total # of search terms:  22
                total # of commands    :  14
                total # of cycles      :   2

                on-line connect time   : 0.311
                off preparation time   : 0.167
                -----------------------------
                total searching time   : 0.478
```

```
                         Searcher No. 006

QUEST-DBASE    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #     TOTAL #
  NUMBER        RELV       PREL       NREL       EVAL       NEVL      RETRIEVED

  002218         37         36        156        229          0          229


                    # of relevant items    :  14
                    # of partially relv    :   4
                    #  of  not relevant    :   7
                    ----------------------------
                    total # evaluated      :  25
                    #  not evaluated       :   0
                    -----------------------------
                    total # retrieved      :  25

                           recall          : 0.247
                         precision         : 0.720

                    total # of search terms:   4
                    total # of commands    :  14
                    total # of cycles      :   3

                    on-line connect time   : 0.205
                    off preparation time   : 0.167
                    -----------------------------
                    total searching time   : 0.372


  005148         16         23         48         87          1           88


                    # of relevant items    :   1
                    # of partially relv    :   3
                    #  of  not relevant    :   2
                    ----------------------------
                    total # evaluated      :   6
                    #  not evaluated       :   0
                    -----------------------------
                    total # retrieved      :   6

                           recall          : 0.103
                         precision         : 0.667

                    total # of search terms:   6
                    total # of commands    :  11
                    total # of cycles      :   2

                    on-line connect time   : 0.234
                    off preparation time   : 0.167
                    -----------------------------
                    total searching time   : 0.401
```

```
                         Searcher No. 006

QUEST-DBASE    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #
 NUMBER         RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

 007075          70         39         40        149        336        485


                  # of relevant items    :   0
                  # of partially relv    :   0
                  #  of  not relevant    :   0
                  ----------------------------
                  total # evaluated      :   0
                  #  not evaluated       :   1
                  -----------------------------
                  total # retrieved      :   1

                        recall           : 0.000
                       precision         : 0.000

                  total # of search terms:   4
                  total # of commands    :   7
                  total # of cycles      :   3

                  on-line connect time   : 0.185
                  off preparation time   : 0.250
                  -----------------------------
                  total searching time   : 0.435


 013015           7         36        106        149         14        163


                  # of relevant items    :   2
                  # of partially relv    :   8
                  #  of  not relevant    :  19
                  ----------------------------
                  total # evaluated      :  29
                  #  not evaluated       :   1
                  -----------------------------
                  total # retrieved      :  30

                        recall           : 0.233
                       precision         : 0.345

                  total # of search terms:   6
                  total # of commands    :  11
                  total # of cycles      :   1

                  on-line connect time   : 0.145
                  off preparation time   : 0.250
                  -----------------------------
                  total searching time   : 0.395
```

```
                         Searcher No. 006

QUEST-DBASE   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #    TOTAL #
  NUMBER        RELV      PREL      NREL      EVAL      NEVL    RETRIEVED

  014151         35        71        51       157         2        159

                # of relevant items    :  11
                # of partially relv    :  19
                #  of  not relevant    :   7
                -----------------------------
                total # evaluated      :  37
                #  not evaluated       :   2
                ------------------------------
                total # retrieved      :  39

                       recall          : 0.283
                     precision         : 0.811

                total # of search terms:  12
                total # of commands    :  11
                total # of cycles      :   2

                on-line connect time   : 0.173
                off preparation time   : 0.167
                ------------------------------
                total searching time   : 0.340


  018015         66        38        46       150       613        763

                # of relevant items    :  18
                # of partially relv    :  11
                #  of  not relevant    :  10
                -----------------------------
                total # evaluated      :  39
                #  not evaluated       :  30
                ------------------------------
                total # retrieved      :  69

                       recall          : 0.279
                     precision         : 0.744

                total # of search terms:   6
                total # of commands    :  15
                total # of cycles      :   2

                on-line connect time   : 0.259
                off preparation time   : 0.167
                ------------------------------
                total searching time   : 0.426
```

```
                              Searcher No. 007

QUEST-DBASE    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #
  NUMBER        RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

  024191          1          4         30         35          0          35


                   # of relevant items    :   1
                   # of partially relv    :   2
                   #  of  not relevant    :   7
                   ----------------------------
                   total # evaluated      :  10
                   #  not evaluated       :   0
                   -----------------------------
                   total # retrieved      :  10

                          recall          : 0.600
                         precision        : 0.300

                   total # of search terms:   4
                   total # of commands    :  13
                   total # of cycles      :   5

                   on-line connect time   : 0.289
                   off preparation time   : 0.200
                   -----------------------------
                   total searching time   : 0.489


  028038          5         23         39         67          0          67

                   # of relevant items    :   4
                   # of partially relv    :  14
                   #  of  not relevant    :  18
                   ----------------------------
                   total # evaluated      :  36
                   #  not evaluated       :   0
                   -----------------------------
                   total # retrieved      :  36

                          recall          : 0.643
                         precision        : 0.500

                   total # of search terms:   9
                   total # of commands    :  13
                   total # of cycles      :   4

                   on-line connect time   : 0.272
                   off preparation time   : 0.200
                   -----------------------------
                   total searching time   : 0.472
```

```
                         Searcher No. 007

QUEST-DBASE   TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #     TOTAL #
  NUMBER        RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

  030071         57         25         13         95          0          95

                  # of relevant items    :   7
                  # of partially relv    :   1
                  #  of  not relevant    :   2
                  ----------------------------
                  total # evaluated      :  10
                  #  not evaluated       :   0
                  -----------------------------
                  total # retrieved      :  10

                       recall            : 0.097
                      precision          : 0.800

                  total # of search terms:  10
                  total # of commands    :  14
                  total # of cycles      :   4

                  on-line connect time   : 0.283
                  off preparation time   : 0.066
                  -----------------------------
                  total searching time   : 0.349


  031061         14         15         85        114          0         114

                  # of relevant items    :   1
                  # of partially relv    :   0
                  #  of  not relevant    :  19
                  ----------------------------
                  total # evaluated      :  20
                  #  not evaluated       :   0
                  -----------------------------
                  total # retrieved      :  20

                       recall            : 0.034
                      precision          : 0.050

                  total # of search terms:  13
                  total # of commands    :  11
                  total # of cycles      :   3

                  on-line connect time   : 0.448
                  off preparation time   : 0.100
                  -----------------------------
                  total searching time   : 0.548
```

```
                                 Searcher No. 007

QUEST-DBASE     TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #
  NUMBER          RELV       PREL       NREL       EVAL       NEVL    RETRIEVED

  036090           62         49         39        150         57        207

                        # of relevant items    :  13
                        # of partially relv    :  13
                        #  of  not relevant    :  11
                        ----------------------------
                        total # evaluated      :  37
                        #  not evaluated       :  36
                        -----------------------------
                        total # retrieved      :  73

                               recall          : 0.234
                             precision         : 0.703

                        total # of search terms:  13
                        total # of commands    :  20
                        total # of cycles      :   7

                        on-line connect time   : 0.341
                        off preparation time   : 0.167
                        -----------------------------
                        total searching time   : 0.508
```

```
                         Searcher No. 008

QUEST-DBASE    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #
  NUMBER        RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

  019075         27         49         74        150         52        202


                   # of relevant items     :   6
                   # of partially relv     :  15
                   #  of  not relevant     :  15
                   ----------------------------
                   total # evaluated       :  36
                   #  not evaluated        :   4
                   -----------------------------
                   total # retrieved       :  40

                         recall            : 0.276
                        precision          : 0.583

                   total # of search terms:   8
                   total # of commands     :  26
                   total # of cycles       :   9

                   on-line connect time    : 0.272
                   off preparation time    : 0.133
                   -----------------------------
                     total searching time    : 0.405



  022108         15        135          0        150        365        515


                   # of relevant items     :   2
                   # of partially relv     :  18
                   #  of  not relevant     :   0
                   ----------------------------
                   total # evaluated       :  20
                   #  not evaluated        :  83
                   -----------------------------
                   total # retrieved       : 103

                         recall            : 0.133
                        precision          : 1.000

                   total # of search terms:  22
                   total # of commands     :  14
                   total # of cycles       :   4

                   on-line connect time    : 0.260
                   off preparation time    : 0.167
                   -----------------------------
                   total searching time    : 0.427
```

```
                              Searcher No. 008

QUEST-DBASE    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #
  NUMBER        RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

  032008        113         19         18        150        298        448

                    # of relevant items    :  42
                    # of partially relv    :   3
                    #  of  not relevant    :   0
                    ----------------------------
                    total # evaluated      :  45
                    #  not evaluated       :  74
                    -----------------------------
                    total # retrieved      : 119

                           recall          : 0.341
                          precision        : 1.000

                    total # of search terms:  31
                    total # of commands    :  31
                    total # of cycles      :  12

                    on-line connect time   : 0.633
                    off preparation time   : 0.333
                    -----------------------------
                    total searching time   : 0.966


  033008         44         57         49        150        123        273

                    # of relevant items    :   0
                    # of partially relv    :   0
                    #  of  not relevant    :   3
                    ----------------------------
                    total # evaluated      :   3
                    #  not evaluated       :   2
                    -----------------------------
                    total # retrieved      :   5

                           recall          : 0.000
                          precision        : 0.000

                    total # of search terms:  39
                    total # of commands    :  16
                    total # of cycles      :   4

                    on-line connect time   : 0.450
                    off preparation time   : 0.250
                    -----------------------------
                    total searching time   : 0.700
```

```
                         Searcher No. 008

QUEST-DBASE    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #
  NUMBER        RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

  034013         10         39        100        149        207        356

                 # of relevant items     :   4
                 # of partially relv     :  12
                 #  of  not relevant     :  70
                 ----------------------------
                 total # evaluated       :  86
                 #  not evaluated        : 186
                 -----------------------------
                 total # retrieved       : 272

                        recall           : 0.327
                       precision         : 0.186

                 total # of search terms:   8
                 total # of commands     :  15
                 total # of cycles       :   6

                 on-line connect time    : 0.426
                 off preparation time    : 0.133
                 -----------------------------
                 total searching time    : 0.559


  035154         31         20         14         65          0         65

                 # of relevant items     :   6
                 # of partially relv     :   5
                 #  of  not relevant     :   5
                 ----------------------------
                 total # evaluated       :  16
                 #  not evaluated        :   0
                 -----------------------------
                 total # retrieved       :  16

                        recall           : 0.216
                       precision         : 0.688

                 total # of search terms:  20
                 total # of commands     :  22
                 total # of cycles       :   6

                 on-line connect time    : 0.361
                 off preparation time    : 0.200
                 -----------------------------
                 total searching time    : 0.561
```

```
                          Searcher No. 009

QUEST-DBASE    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #
  NUMBER        RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

  004154          60         58         33        151          8        159


                 # of relevant items    :   6
                 # of partially relv    :   1
                 #  of  not relevant    :   3
                 ----------------------------
                 total # evaluated      :  10
                 #  not evaluated       :   1
                 -----------------------------
                 total # retrieved      :  11

                        recall          : 0.059
                      precision         : 0.700

                 total # of search terms:  10
                 total # of commands    :  23
                 total # of cycles      :   6

                 on-line connect time   : 0.145
                 off preparation time   : 0.300
                 -----------------------------
                 total searching time   : 0.445


  008154           2          5         54         61          0         61

                 # of relevant items    :   0
                 # of partially relv    :   0
                 #  of  not relevant    :   8
                 ----------------------------
                 total # evaluated      :   8
                 #  not evaluated       :   0
                 -----------------------------
                 total # retrieved      :   8

                        recall          : 0.000
                      precision         : 0.000

                 total # of search terms:   8
                 total # of commands    :  12
                 total # of cycles      :   3

                 on-line connect time   : 0.092
                 off preparation time   : 0.250
                 -----------------------------
                 total searching time   : 0.342
```

```
                         Searcher No. 009

QUEST-DBASE   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #
  NUMBER        RELV      PREL      NREL      EVAL      NEVL   RETRIEVED

  010154          4        15       130       149       310       459

                # of relevant items     :   1
                # of partially relv    :   0
                #  of  not relevant     :   0
                -----------------------------
                total # evaluated       :   1
                #  not evaluated        :   3
                ------------------------------
                total # retrieved       :   4

                       recall           : 0.052
                      precision         : 1.000

                total # of search terms:    8
                total # of commands     :  20
                total # of cycles       :   7

                on-line connect time    : 0.111
                off preparation time    : 0.167
                ------------------------------
                total searching time    : 0.278


  011154          9        25       115       149       161       310

                # of relevant items     :   1
                # of partially relv    :   0
                #  of  not relevant     :   1
                -----------------------------
                total # evaluated       :   2
                #  not evaluated        :   7
                ------------------------------
                total # retrieved       :   9

                       recall           : 0.029
                      precision         : 0.500

                total # of search terms:   14
                total # of commands     :   5
                total # of cycles       :   1

                on-line connect time    : 0.074
                off preparation time    : 0.250
                ------------------------------
                total searching time    : 0.324
```

```
                        Searcher No. 009

QUEST-DBASE   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #    TOTAL #
  NUMBER        RELV      PREL      NREL      EVAL      NEVL    RETRIEVED

  015154         28        86        36        150       172        322

                # of relevant items    :  9
                # of partially relv    :  12
                #  of  not relevant    :  3
                ----------------------------
                total # evaluated      :  24
                #  not evaluated       :  36
                -----------------------------
                total # retrieved      :  60

                       recall          : 0.184
                     precision         : 0.875

                total # of search terms:  8
                total # of commands    :  13
                total # of cycles      :  2

                on-line connect time   : 0.186
                off preparation time   : 0.167
                -----------------------------
                total searching time   : 0.353
```

```
                         Searcher No. 010

QUEST-DBASE   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #
  NUMBER        RELV      PREL      NREL      EVAL      NEVL    RETRIEVED

  004154         60        58        33       151         8        159

                # of relevant items    :  11
                # of partially relv    :  14
                #  of  not relevant    :   7
                ---------------------------
                total # evaluated      :  32
                #  not evaluated       :   1
                ----------------------------
                total # retrieved      :  33

                      recall           : 0.212
                     precision         : 0.781

                total # of search terms:   6
                total # of commands    :  17
                total # of cycles      :   6

                on-line connect time   : 0.303
                off preparation time   : 0.417
                ----------------------------
                total searching time   : 0.720


  008154          2         5        54        61         0         61

                # of relevant items    :   2
                # of partially relv    :   3
                #  of  not relevant    :  51
                ---------------------------
                total # evaluated      :  56
                #  not evaluated       :   0
                ----------------------------
                total # retrieved      :  56

                      recall           : 0.714
                     precision         : 0.089

                 total # of search terms:   4
                total # of commands    :   8
                total # of cycles      :   2

                on-line connect time   : 0.156
                off preparation time   : 0.233
                ----------------------------
                total searching time   : 0.389
```

```
                              Searcher No. 010

 QUEST-DBASE    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #
   NUMBER        RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

   010154          4         15        130        149        310        459

                      # of relevant items    :   0
                      # of partially relv    :   0
                      #  of  not relevant    :  28
                      ----------------------------
                      total # evaluated      :  28
                      #  not evaluated       :  72
                      -----------------------------
                      total # retrieved      : 100

                             recall          : 0.000
                            precision        : 0.000

                      total # of search terms:   7
                      total # of commands    :  15
                      total # of cycles      :   5

                      on-line connect time   : 0.234
                      off preparation time   : 0.200
                      -----------------------------
                      total searching time   : 0.434


   011154          9         25        115        149        161        310

                      # of relevant items    :   3
                      # of partially relv    :   6
                      #  of  not relevant    :  31
                      ----------------------------
                      total # evaluated      :  40
                      #  not evaluated       :  58
                      -----------------------------
                      total # retrieved      :  98

                             recall          : 0.265
                            precision        : 0.225

                      total # of search terms:   9
                      total # of commands    :   5
                      total # of cycles      :   2

                      on-line connect time   : 0.170
                      off preparation time   : 0.250
                      -----------------------------
                      total searching time   : 0.420
```

```
                         Searcher No. 010

QUEST-DBASE   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #    TOTAL #
  NUMBER        RELV      PREL      NREL      EVAL      NEVL    RETRIEVED

  015154         28        86        36       150       172        322

                     # of relevant items    :  27
                    # of partially relv    :  61
                    #  of  not relevant    :  30
                    ----------------------------
                    total # evaluated      : 118
                    #  not evaluated       : 144
                    -----------------------------
                    total # retrieved      : 262

                           recall          : 0.772
                          precision        : 0.746

                    total # of search terms:   1
                    total # of commands    :   6
                    total # of cycles      :   1

                    on-line connect time   : 0.191
                    off preparation time   : 0.133
                    -----------------------------
                    total searching time   : 0.324
```

```
                         Searcher No. 011

QUEST-DBASE  TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #
  NUMBER      RELV      PREL      NREL      EVAL      NEVL    RETRIEVED

  006006       11         5        134       150        88       238

                # of relevant items    :   0
                # of partially relv    :   0
                #  of  not relevant    :   0
                ---------------------------
                total # evaluated      :   0
                #  not evaluated       :   1
                ----------------------------
                total # retrieved      :   1

                      recall           : 0.000
                     precision         : 0.000

                total # of search terms:  12
                total # of commands    :  41
                total # of cycles      :   6

                on-line connect time   : 1.123
                off preparation time   : 0.833
                ----------------------------
                total searching time   : 1.956


  012013        6        21        121       148        90       238

                # of relevant items    :   4
                # of partially relv    :   9
                #  of  not relevant    :  31
                ---------------------------
                total # evaluated      :  44
                #  not evaluated       :  38
                ----------------------------
                total # retrieved      :  82

                      recall           : 0.481
                     precision         : 0.295

                total # of search terms:  33
                total # of commands    :  37
                total # of cycles      :   2

                on-line connect time   : 0.898
                off preparation time   : 0.250
                ----------------------------
                total searching time   : 1.148
```

```
                              Searcher No. 011

QUEST-DBASE    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #
  NUMBER         RELV       PREL       NREL       EVAL       NEVL    RETRIEVED

  017005          36         26         88        150        377        527

                    # of relevant items    :   6
                    # of partially relv    :   9
                    #  of  not relevant    :  38
                    ----------------------------
                    total # evaluated      :  53
                    #  not evaluated       :  64
                    -----------------------------
                    total # retrieved      : 117

                          recall           : 0.242
                         precision         : 0.283

                    total # of search terms:  11
                    total # of commands    :  20
                    total # of cycles      :   2

                    on-line connect time   : 0.378
                    off preparation time   : 0.250
                    -----------------------------
                    total searching time   : 0.628


  027013          35         69         46        150         58        208

                    # of relevant items    :   7
                    # of partially relv    :  19
                    #  of  not relevant    :  13
                    ----------------------------
                    total # evaluated      :  39
                    #  not evaluated       :  15
                    -----------------------------
                    total # retrieved      :  54

                          recall           : 0.250
                         precision         : 0.667

                    total # of search terms:  11
                    total # of commands    :  39
                    total # of cycles      :   7

                    on-line connect time   : 0.499
                    off preparation time   : 0.250
                    -----------------------------
                    total searching time   : 0.749
```

```
                              Searcher No. 011

QUEST-DBASE   TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #
  NUMBER       RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

  029008        36         34         80         150        77         227

                    # of relevant items    :   8
                    # of partially relv    :   8
                    #  of  not relevant    :  12
                    ----------------------------
                    total # evaluated      :  28
                    #  not evaluated       :  22
                    -----------------------------
                    total # retrieved      :  50

                          recall           : 0.229
                         precision         : 0.571

                    total # of search terms:  24
                    total # of commands    :  32
                    total # of cycles      :   2

                    on-line connect time   : 0.076
                    off preparation time   : 0.083
                    -----------------------------
                    total searching time   : 0.159
```

```
                          Searcher No. 012

QUEST-DBASE    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #
  NUMBER         RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

  024191           1          4         30         35          0          35


                   # of relevant items     :   1
                   # of partially relv     :   1
                   #  of  not relevant     :   4
                   ---------------------------
                   total # evaluated       :   6
                   #  not evaluated        :   0
                   ----------------------------
                   total # retrieved       :   6

                         recall            : 0.400
                        precision          : 0.333

                   total # of search terms:  14
                   total # of commands     :  13
                   total # of cycles       :   2

                   on-line connect time    : 0.267
                   off preparation time    : 0.333
                   ----------------------------
                   total searching time    : 0.600


  026038          37         39          8         84          0          84


                   # of relevant items     :   1
                   # of partially relv     :   0
                   #  of  not relevant     :   0
                   ---------------------------
                   total # evaluated       :   1
                   #  not evaluated        :   0
                   ----------------------------
                   total # retrieved       :   1

                         recall            : 0.013
                        precision          : 1.000

                   total # of search terms:   5
                   total # of commands     :   9
                   total # of cycles       :   3

                   on-line connect time    : 0.208
                   off preparation time    : 0.333
                   ----------------------------
                   total searching time    : 0.541
```

```
                         Searcher No. 012

QUEST-DBASE   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #    TOTAL #
  NUMBER        RELV      PREL      NREL      EVAL      NEVL    RETRIEVED

  028038          5        23        39        67        0         67

                  # of relevant items     :  4
                  # of partially relv     :  5
                  #  of  not relevant     :  2
                  ----------------------------
                  total # evaluated       : 11
                  #  not evaluated        :  0
                  -----------------------------
                  total # retrieved       : 11

                       recall             : 0.321
                      precision           : 0.818

                  total # of search terms:   8
                  total # of commands     :  9
                  total # of cycles       :  1

                  on-line connect time    : 0.150
                  off preparation time    : 0.250
                  -----------------------------
                  total searching time    : 0.400


  030071         57        25        13        95        0         95

                  # of relevant items     : 29
                  # of partially relv     : 14
                  #  of  not relevant     :  5
                  ----------------------------
                  total # evaluated       : 48
                  #  not evaluated        :  0
                  -----------------------------
                  total # retrieved       : 48

                       recall             : 0.524
                      precision           : 0.896

                  total # of search terms:  10
                  total # of commands     : 12
                  total # of cycles       :  1

                  on-line connect time    : 0.183
                  off preparation time    : 0.250
                  -----------------------------
                  total searching time    : 0.433
```

```
                          Searcher No. 012

QUEST-DBASE   TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #
  NUMBER        RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

  031061         14         15         85        114          0         114


                    # of relevant items     :   6
                    # of partially relv     :   6
                    #  of  not relevant     :  34
                    -----------------------------
                    total # evaluated       :  46
                    #  not evaluated        :   0
                    ------------------------------
                    total # retrieved       :  46

                           recall           : 0.414
                          precision         : 0.261

                    total # of search terms:    4
                    total # of commands     :  10
                    total # of cycles       :   3

                    on-line connect time    : 0.141
                    off preparation time    : 0.167
                    ------------------------------
                    total searching time    : 0.308


  036090         62         49         39        150         57         207


                    # of relevant items     :   5
                    # of partially relv     :   2
                    #  of  not relevant     :   5
                    -----------------------------
                    total # evaluated       :  12
                    #  not evaluated        :   0
                    ------------------------------
                    total # retrieved       :  12

                           recall           : 0.063
                          precision         : 0.583

                    total # of search terms:   13
                    total # of commands     :  13
                    total # of cycles       :   2

                    on-line connect time    : 0.213
                    off preparation time    : 0.417
                    ------------------------------
                    total searching time    : 0.630
```

```
                         Searcher No. 013

QUEST-DBASE   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #    TOTAL #
  NUMBER       RELV      PREL      NREL      EVAL      NEVL     RETRIEVED

  001011        27        46        75        148       626        774

               # of relevant items    :   5
               # of partially relv    :   3
               #  of  not relevant    :   0
               ----------------------------
               total # evaluated      :   8
               #  not evaluated       :  28
               -----------------------------
               total # retrieved      :  36

                     recall           : 0.110
                    precision         : 1.000

               total # of search terms:  13
               total # of commands    :  11
               total # of cycles      :   3

               on-line connect time   : 0.301
               off preparation time   : 0.333
               -----------------------------
               total searching time   : 0.634


  005148        16        23        48         87         1         88

               # of relevant items    :   0
               # of partially relv    :   0
               #  of  not relevant    :   0
               ----------------------------
               total # evaluated      :   0
               #  not evaluated       :   1
               -----------------------------
               total # retrieved      :   1

                     recall           : 0.000
                    precision         : 0.000

               total # of search terms:  21
               total # of commands    :  13
               total # of cycles      :   3

               on-line connect time   : 0.345
               off preparation time   : 0.167
               -----------------------------
               total searching time   : 0.512
```

```
                              Searcher No. 013

QUEST-DBASE    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #
  NUMBER        RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

  013015          7         36        106        149         14         163

                  # of relevant items     :   3
                  # of partially relv     :  18
                  #  of  not relevant     :  39
                  ----------------------------
                  total # evaluated       :  60
                  #  not evaluated        :   5
                  -----------------------------
                  total # retrieved       :  65

                        recall            : 0.488
                       precision          : 0.350

                  total # of search terms:   6
                  total # of commands     :  11
                  total # of cycles       :   3

                  on-line connect time    : 0.206
                  off preparation time    : 0.083
                  -----------------------------
                  total searching time    : 0.289


  016011         25         37        108        170          0         170

                  # of relevant items     :   4
                  # of partially relv     :   4
                  #  of  not relevant     :  37
                  ----------------------------
                  total # evaluated       :  45
                  #  not evaluated        :   0
                  -----------------------------
                  total # retrieved       :  45

                        recall            : 0.129
                       precision          : 0.178

                  total # of search terms:   2
                  total # of commands     :   9
                  total # of cycles       :   3

                  on-line connect time    : 0.141
                  off preparation time    : 0.117
                  -----------------------------
                  total searching time    : 0.258
```

```
                    Searcher No. 013

QUEST-DBASE   TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #
  NUMBER       RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

  019075        27         49         74        150         52         202

                  # of relevant items     :  6
                  # of partially relv     :  12
                  #  of  not relevant     :  2
                  ----------------------------
                  total # evaluated       :  20
                  #  not evaluated        :  5
                  -----------------------------
                  total # retrieved       :  25

                        recall            : 0.237
                       precision          : 0.900

                  total # of search terms:   5
                  total # of commands     :  8
                  total # of cycles       :  1

                  on-line connect time    : 0.157
                  off preparation time    : 0.167
                  -----------------------------
                  total searching time    : 0.324


  020015        26         43         81        150        161         311

                  # of relevant items     :  5
                  # of partially relv     :  11
                  #  of  not relevant     :  33
                  ----------------------------
                  total # evaluated       :  49
                  #  not evaluated        :  43
                  -----------------------------
                  total # retrieved       :  92

                        recall            : 0.232
                       precision          : 0.327

                  total # of search terms:   5
                  total # of commands     :  14
                  total # of cycles       :  4

                  on-line connect time    : 0.141
                  off preparation time    : 0.117
                  -----------------------------
                  total searching time    : 0.258
```

```
                         Searcher No. 014

QUEST-DBASE   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #    TOTAL #
  NUMBER        RELV      PREL      NREL      EVAL      NEVL    RETRIEVED

  003064         36        47        68       151       272        423

                  # of relevant items    :   1
                  # of partially relv    :   2
                  #  of  not relevant    :   1
                  ----------------------------
                  total # evaluated        :   4
                  #  not evaluated       :  12
                  -----------------------------
                  total # retrieved      :  16

                         recall          : 0.036
                        precision        : 0.750

                  total # of search terms:   6
                  total # of commands    :   4
                  total # of cycles      :   1

                  on-line connect time   : 0.059
                  off preparation time   : 0.167
                  -----------------------------
                  total searching time   : 0.226


  007075         70        39        40       149       335        484

                  # of relevant items    :   1
                  # of partially relv    :   0
                  #  of  not relevant    :   1
                  ----------------------------
                  total # evaluated      :   2
                  #  not evaluated       :  10
                   -----------------------------
                  total # retrieved      :  12

                         recall          : 0.009
                        precision        : 0.500

                  total # of search terms:   9
                  total # of commands    :   6
                  total # of cycles      :   1

                  on-line connect time   : 0.063
                  off preparation time   : 0.117
                  -----------------------------
                  total searching time   : 0.180
```

```
                         Searcher No. 014

QUEST-DBASE   TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #
  NUMBER        RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

  009037         18         48         84        150        495        645


                    # of relevant items    :   2
                    # of partially relv    :   6
                    #  of  not relevant    :  29
                    ----------------------------
                    total # evaluated      :  37
                    #  not evaluated       :  97
                    -----------------------------
                    total # retrieved      : 134

                           recall          : 0.121
                          precision        : 0.216

                    total # of search terms:   3
                    total # of commands    :   8
                    total # of cycles      :   2

                    on-line connect time   : 0.111
                    off preparation time   : 0.250
                    -----------------------------
                    total searching time   : 0.361


  018015         66         38         46        150        612        762


                    # of relevant items    :   0
                    # of partially relv    :   0
                    #  of  not relevant    :   0
                    ----------------------------
                    total # evaluated      :   0
                    #  not evaluated       :   0
                    -----------------------------
                    total # retrieved      :   0

                           recall          : 0.000
                          precision        : 0.000

                    total # of search terms:   5
                    total # of commands    :   5
                    total # of cycles      :   2

                    on-line connect time   : 0.193
                    off preparation time   : 0.083
                    -----------------------------
                    total searching time   : 0.276
                    Searcher No. 014

QUEST-DBASE   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #    TOTAL #
  NUMBER       RELV      PREL      NREL      EVAL      NEVL     RETRIEVED

  021037        19         6        77       102         0        102

               # of relevant items    :   1
               # of partially relv    :   0
               #  of  not relevant    :   0
               ---------------------------
               total # evaluated      :   1
               #  not evaluated       :   0
               ----------------------------
               total # retrieved      :   1

                      recall          : 0.040
                     precision        : 1.000

               total # of search terms:   4
               total # of commands    :  11
               total # of cycles      :   3

               on-line connect time   : 0.230
               off preparation time   : 0.133
               ----------------------------
               total searching time   : 0.363


  025001        30        26        94       150       430        580

               # of relevant items    :   3
               # of partially relv    :   2
               #  of  not relevant    :   6
               ---------------------------
               total # evaluated      :  11
               #  not evaluated       :  48
               ----------------------------
               total # retrieved      :  59

                      recall          : 0.089
                     precision        : 0.455

               total # of search terms:   5
               total # of commands    :   6
               total # of cycles      :   2

               on-line connect time   : 0.094
               off preparation time   : 0.117
               ----------------------------
               total searching time   : 0.211
```

```
                              Searcher No. 015

QUEST-DBASE    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #
  NUMBER        RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

  023032         29          9         51         89          0          89


                    # of relevant items     :  23
                    # of partially relv     :   3
                    #  of  not relevant     :   9
                    ----------------------------
                    total # evaluated       :  35
                    #  not evaluated        :   0
                    -----------------------------
                    total # retrieved       :  35

                           recall           : 0.684
                          precision         : 0.743

                    total # of search terms:   8
                    total # of commands     :  22
                    total # of cycles       :   3

                    on-line connect time    : 0.487
                    off preparation time    : 0.500
                    -----------------------------
                    total searching time    : 0.987


  026038         37         39          8         84          0          84


                    # of relevant items     :   0
                    # of partially relv     :   0
                    #  of  not relevant     :   3
                    ----------------------------
                    total # evaluated       :   3
                    #  not evaluated        :   0
                    -----------------------------
                    total # retrieved       :   3

                           recall           : 0.000
                          precision         : 0.000

                    total # of search terms:  15
                    total # of commands     :  19
                    total # of cycles       :   3

                    on-line connect time    : 0.255
                    off preparation time    : 0.250
                    -----------------------------
                    total searching time    : 0.505
```

```
                          Searcher No. 015

QUEST-DBASE    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #     TOTAL #
  NUMBER        RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

  037016         78         18         54        150         69         219


                   # of relevant items     :  11
                   # of partially relv     :   3
                   #  of  not relevant     :  33
                   ---------------------------
                   total # evaluated       :  47
                   #  not evaluated        :  25
                   ----------------------------
                   total # retrieved       :  72

                          recall           : 0.146
                         precision         : 0.298

                   total # of search terms:   7
                   total # of commands     :  26
                   total # of cycles       :   5

                   on-line connect time    : 0.733
                   off preparation time    : 0.500
                   ----------------------------
                   total searching time    : 1.233


  038061         79         29         42        150        595         745


                   # of relevant items     :   8
                   # of partially relv     :   5
                   #  of  not relevant     :   3
                   ---------------------------
                   total # evaluated       :  16
                   #  not evaluated        :  53
                   ----------------------------
                   total # retrieved       :  69

                          recall           : 0.120
                         precision         : 0.813

                   total # of search terms:  16
                   total # of commands     :  24
                   total # of cycles       :   3

                   on-line connect time    : 0.361
                   off preparation time    : 0.500
                   ----------------------------
                   total searching time    : 0.861
```

```
                         Searcher No. 015

QUEST-DBASE    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #
  NUMBER        RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

  039015         26         38        102        166          0        166


                  # of relevant items     :   0
                  # of partially relv     :   0
                  #  of  not relevant     :   0
                  ----------------------------
                  total # evaluated       :   0
                  #  not evaluated        :   0
                  -----------------------------
                  total # retrieved       :   0

                         recall           : 0.000
                       precision          : 0.000

                  total # of search terms:  10
                  total # of commands     :  10
                  total # of cycles       :   3

                  on-line connect time    : 0.166
                  off preparation time    : 0.500
                  -----------------------------
                  total searching time    : 0.666



  040016         77         40         32        149        331        480


                  # of relevant items     :  10
                  # of partially relv     :   6
                  #  of  not relevant     :   0
                  ----------------------------
                  total # evaluated       :  16
                  #  not evaluated        :  61
                  -----------------------------
                  total # retrieved       :  77

                         recall           : 0.137
                       precision          : 1.000

                  total # of search terms:   8
                  total # of commands     :  32
                  total # of cycles       :   9

                  on-line connect time    : 0.443
                  off preparation time    : 0.250
                  -----------------------------
                  total searching time    : 0.693
```

```
                         Searcher No. 016

QUEST-DBASE   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #    TOTAL #
  NUMBER        RELV      PREL      NREL      EVAL      NEVL     RETRIEVED

  001011         27        46        75       148       626        774


                  # of relevant items     :   1
                  # of partially relv     :   9
                  #  of  not relevant     :  25
                  ----------------------------
                  total # evaluated       :  35
                  #  not evaluated        :   0
                  -----------------------------
                  total # retrieved       :  35

                         recall           : 0.137
                        precision         : 0.286

                  total # of search terms:    9
                  total # of commands     :  14
                  total # of cycles       :   1

                  on-line connect time    : 0.208
                  off preparation time    : 0.333
                  -----------------------------
                  total searching time    : 0.541


  003064         36        47        68       151       272        423


                  # of relevant items     :   0
                  # of partially relv     :   0
                  #  of  not relevant     :   0
                  ----------------------------
                  total # evaluated       :   0
                  #  not evaluated        : 117
                  -----------------------------
                  total # retrieved       : 117

                         recall           : 0.000
                        precision         : 0.000

                  total # of search terms:    7
                  total # of commands     :  17
                  total # of cycles       :   1

                  on-line connect time    : 0.536
                  off preparation time    : 0.333
                  -----------------------------
                  total searching time    : 0.869
```

```
                          Searcher No. 016

QUEST-DBASE    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #
  NUMBER         RELV       PREL       NREL       EVAL       NEVL    RETRIEVED

  009037          18         48         84        150        495        645

                   # of relevant items     :   0
                   # of partially relv     :   3
                   #  of  not relevant     :.  27
                   ----------------------------
                   total # evaluated       :  30
                   #  not evaluated        :  54
                   -----------------------------
                   total # retrieved       :  84

                          recall           : 0.045
                         precision         : 0.100

                   total # of search terms:    6
                   total # of commands     :  13
                   total # of cycles       :   1

                   on-line connect time    : 0.163
                   off preparation time    : 0.500
                   -----------------------------
                   total searching time    : 0.663


  016011          25         37        108        170          0        170

                   # of relevant items     :  15
                   # of partially relv     :  17
                   #  of  not relevant     :  27
                   ----------------------------
                   total # evaluated       :  59
                   #  not evaluated        :   0
                   -----------------------------
                   total # retrieved       :  59

                          recall           : 0.516
                         precision         : 0.542

                   total # of search terms:    5
                   total # of commands     :   8
                   total # of cycles       :   1

                   on-line connect time    : 0.191
                   off preparation time    : 0.250
                   -----------------------------
                   total searching time    : 0.441
```

```
                              Searcher No. 016

QUEST-DBASE     TOTAL #     TOTAL #     TOTAL #     TOTAL #     TOTAL #     TOTAL #
  NUMBER         RELV        PREL        NREL        EVAL        NEVL      RETRIEVED

  021037          19           6          77          102          0          102

                # of relevant items    :   0
                # of partially relv    :   2
                #  of  not relevant    :  28
                -----------------------------
                total # evaluated      :  30
                #  not evaluated       :   0
                ------------------------------
                total # retrieved      :  30

                     recall            : 0.080
                    precision          : 0.066

                total # of search terms:  11
                total # of commands    :  17
                total # of cycles      :   3

                on-line connect time   : 0.416
                off preparation time   : 0.500
                ------------------------------
                total searching time   : 0.916


  025001          30          26          94          150        430          580

                # of relevant items    :   0
                # of partially relv    :   0
                #  of  not relevant    :   3
                -----------------------------
                total # evaluated      :   3
                #  not evaluated       :  33
                ------------------------------
                total # retrieved      :  36

                     recall            : 0.000
                    precision          : 0.000

                total # of search terms:  12
                total # of commands    :  17
                total # of cycles      :   2

                on-line connect time   : 0.511
                off preparation time   : 0.750
                ------------------------------
                total searching time   : 1.261
```

```
                      Searcher No. 017

QUEST-DBASE   TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #
  NUMBER        RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

  019075          27         49         74        150         52        202

                # of relevant items     :   7
                # of partially relv     :  14
                #  of  not relevant     :  22
                ----------------------------
                total # evaluated       :  43
                #  not evaluated        :  18
                -----------------------------
                total # retrieved       :  61

                      recall            : 0.276
                     precision          : 0.488

                total # of search terms:    7
                total # of commands     :  11
                total # of cycles       :   3

                on-line connect time    : 0.176
                off preparation time    : 0.250
                -----------------------------
                total searching time    : 0.426


  020015          26         43         81        150        161        311

                # of relevant items     :   0
                # of partially relv     :   4
                #  of  not relevant     :  10
                ----------------------------
                total # evaluated       :  14
                #  not evaluated        :  25
                -----------------------------
                total # retrieved       :  39

                      recall            : 0.058
                     precision          : 0.286

                total # of search terms:    8
                total # of commands     :  18
                total # of cycles       :   5

                on-line connect time    : 0.227
                off preparation time    : 0.167
                -----------------------------
                total searching time    : 0.394
```

```
                         Searcher No. 017

QUEST-DBASE   TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #
  NUMBER       RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

  032008        113         19         18        150        298        448


                 # of relevant items    :   0
                 # of partially relv    :   1
                 #  of  not relevant    :  17
                 -----------------------------
                 total # evaluated      :  18
                 #  not evaluated       :   0
                 ------------------------------
                 total # retrieved      :  18

                        recall          : 0.007
                      precision         : 0.055

                 total # of search terms:   9
                 total # of commands    :   9
                 total # of cycles      :   3

                 on-line connect time   : 0.092
                 off preparation time   : 0.167
                 ------------------------------
                 total searching time   : 0.259


  033008         44         57         49        150        123        273


                 # of relevant items    :   3
                 # of partially relv    :   0
                 #  of  not relevant    :   0
                 -----------------------------
                 total # evaluated      :   3
                 #  not evaluated       :   4
                 ------------------------------
                 total # retrieved      :   7

                        recall          : 0.029
                      precision         : 1.000

                 total # of search terms:   6
                 total # of commands    :  17
                 total # of cycles      :   4

                 on-line connect time   : 0.324
                 off preparation time   : 0.667
                 ------------------------------
                 total searching time   : 0.991
```

```
                              Searcher No. 017

QUEST-DBASE    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #     TOTAL #
  NUMBER        RELV       PREL       NREL       EVAL       NEVL      RETRIEVED

  034013         10         39        100        149        207         356

                   # of relevant items     :   0
                   # of partially relv     :   4
                   #  of  not relevant     :   5
                   ---------------------------
                   total # evaluated       :   9
                   #  not evaluated        :   1
                   ----------------------------
                   total # retrieved       :  10

                          recall           : 0.081
                         precision         : 0.444

                   total # of search terms:    6
                   total # of commands     :  15
                   total # of cycles       :   5

                   on-line connect time    : 0.333
                   off preparation time    : 0.333
                   ----------------------------
                   total searching time    : 0.666


  035154         31         20         14         65          0          65

                   # of relevant items     :   1
                   # of partially relv     :   0
                   #  of  not relevant     :   0
                   ---------------------------
                   total # evaluated       :   1
                   #  not evaluated        :   0
                   ----------------------------
                   total # retrieved       :   1

                          recall           : 0.019
                         precision         : 1.000

                   total # of search terms:    3
                   total # of commands     :   6
                   total # of cycles       :   1

                   on-line connect time    : 0.080
                   off preparation time    : 0.083
                   ----------------------------
                   total searching time    : 0.163
```

```
                         Searcher No. 021

QUEST-DBASE   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #    TOTAL #
  NUMBER       RELV      PREL      NREL      EVAL      NEVL     RETRIEVED

  001011        27        46        75        148       626        774

                  # of relevant items    :  11
                  # of partially relv    :  30
                  #  of  not relevant    :  41
                  ----------------------------
                  total # evaluated      :  82
                  #  not evaluated       : 443
                  -----------------------------
                  total # retrieved      : 525

                         recall          : 0.562
                       precision         : 0.500

                  total # of search terms:  12
                  total # of commands    :  19
                  total # of cycles      :   5

                  on-line connect time   : 0.338
                  off preparation time   : 0.250
                  -----------------------------
                  total searching time   : 0.588


  003064        36        47        68        151       272        423

                  # of relevant items    :  13
                  # of partially relv    :  29
                  #  of  not relevant    :  34
                  ----------------------------
                  total # evaluated      :  76
                  #  not evaluated       :  85
                  -----------------------------
                  total # retrieved      : 161

                         recall          : 0.506
                       precision         : 0.553

                  total # of search terms:   8
                  total # of commands    :  13
                  total # of cycles      :   4

                  on-line connect time   : 0.165
                  off preparation time   : 0.250
                  -----------------------------
                  total searching time   : 0.415
```

```
                          Searcher No. 021

QUEST-DBASE   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #    TOTAL #
  NUMBER        RELV      PREL      NREL      EVAL      NEVL    RETRIEVED

  009037         18        48        84       150       495        645

                  # of relevant items    :   1
                  # of partially relv    :   3
                  #  of  not relevant    :   2
                  ---------------------------
                  total # evaluated      :   6
                  #  not evaluated       :  52
                  -----------------------------
                  total # retrieved      :  58

                        recall           : 0.060
                      precision          : 0.667

                  total # of search terms:   8
                  total # of commands    :  13
                  total # of cycles      :   4

                  on-line connect time   : 0.157
                  off preparation time   : 0.200
                  -----------------------------
                  total searching time   : 0.357


  016011         25        37       108       170         0        170

                  # of relevant items    :   3
                  # of partially relv    :   4
                  #  of  not relevant    :  20
                  ---------------------------
                  total # evaluated      :  27
                  #  not evaluated       :   0
                  -----------------------------
                  total # retrieved      :  27

                        recall           : 0.113
                      precision          : 0.259

                  total # of search terms:   4
                  total # of commands    :   7
                  total # of cycles      :   3

                  on-line connect time   : 0.097
                  off preparation time   : 0.250
                  -----------------------------
                  total searching time   : 0.347
```

```
                         Searcher No. 021

QUEST-DBASE   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #
  NUMBER       RELV      PREL      NREL      EVAL      NEVL    RETRIEVED

  021037        19         6        77       102         0       102

                 # of relevant items     :  0
                 # of partially relv     :  1
                 #  of  not relevant     :  5
                 ---------------------------
                 total # evaluated       :  6
                 #  not evaluated        :  0
                 ----------------------------
                 total # retrieved       :  6

                       recall            : 0.040
                      precision          : 0.167

                 total # of search terms:  15
                 total # of commands     : 21
                 total # of cycles       :  5

                 on-line connect time    : 0.327
                 off preparation time    : 0.583
                 ----------------------------
                 total searching time    : 0.910


  025001        30        26        94       150       430       580

                 # of relevant items     :  1
                 # of partially relv     :  0
                 #  of  not relevant     :  0
                 ---------------------------
                 total # evaluated       :  1
                 #  not evaluated        :  6
                 ----------------------------
                 total # retrieved       :  7

                       recall            : 0.017
                      precision          : 1.000

                 total # of search terms:   8
                 total # of commands     : 12
                 total # of cycles       :  3

                 on-line connect time    : 0.175
                 off preparation time    : 0.333
                 ----------------------------
                 total searching time    : 0.508
```

```
                         Searcher No. 023

QUEST-DBASE   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #    TOTAL #
  NUMBER        RELV      PREL      NREL      EVAL      NEVL    RETRIEVED

  024191         1          4        30        35         0         35

                 # of relevant items    :  0
                 # of partially relv    :  1
                 #  of  not relevant    :  10
                 ----------------------------
                 total # evaluated      :  11
                 #  not evaluated       :  0
                 ------------------------------
                 total # retrieved      :  11

                        recall          : 0.200
                      precision         : 0.090

                 total # of search terms:  4
                 total # of commands    :  12
                 total # of cycles      :   3

                 on-line connect time   : 0.334
                 off preparation time   : 0.250
                 ------------------------------
                 total searching time   : 0.584


  026038        37         39         8        84         0         84

                 # of relevant items    :  8
                 # of partially relv    :  19
                 #  of  not relevant    :  0
                 ----------------------------
                 total # evaluated      :  27
                 #  not evaluated       :  0
                 ------------------------------
                 total # retrieved      :  27

                        recall          : 0.355
                      precision         : 1.000

                 total # of search terms:  11
                 total # of commands    :  13
                 total # of cycles      :   3

                 on-line connect time   : 0.218
                 off preparation time   : 0.417
                 ------------------------------
                 total searching time   : 0.635
```

```
                              Searcher No. 023

QUEST-DBASE    TOTAL #     TOTAL #    TOTAL #    TOTAL #    TOTAL #     TOTAL #
  NUMBER         RELV        PREL       NREL       EVAL       NEVL     RETRIEVED

  028038           5          23         39         67          0          67

                   # of relevant items    :  0
                   # of partially relv    :  1
                   #  of  not relevant    :  2
                   ----------------------------
                   total # evaluated      :  3
                   #  not evaluated       :  0
                   -----------------------------
                   total # retrieved      :  3

                          recall          : 0.035
                        precision         : 0.333

                   total # of search terms:  8
                   total # of commands    :  8
                   total # of cycles      :  1

                   on-line connect time   : 0.108
                   off preparation time   : 0.250
                   -----------------------------
                   total searching time   : 0.358


  030071          57          25         13         95          0          95

                   # of relevant items    :  37
                   # of partially relv    :  14
                   #  of  not relevant    :  5
                   ----------------------------
                   total # evaluated      :  56
                   #  not evaluated       :  0
                   -----------------------------
                   total # retrieved      :  56

                          recall          : 0.622
                        precision         : 0.911

                   total # of search terms:  6
                   total # of commands    :  11
                   total # of cycles      :  3

                   on-line connect time   : 0.183
                   off preparation time   : 0.333
                   -----------------------------
                   total searching time   : 0.516
```

```
                         Searcher No. 023

QUEST-DBASE   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #
  NUMBER        RELV      PREL      NREL      EVAL      NEVL    RETRIEVED

  031061         14        15        85       114         0       114

                # of relevant items    :  10
                # of partially relv    :  12
                #  of  not relevant    :  41
                ----------------------------
                total # evaluated      :  63
                #  not evaluated       :   0
                -----------------------------
                total # retrieved      :  63

                       recall          : 0.759
                     precision         : 0.349

                total # of search terms:  28
                total # of commands    :  32
                total # of cycles      :   6

                on-line connect time   : 1.124
                off preparation time   : 0.750
                -----------------------------
                total searching time   : 1.874


  036090         62        49        39       150        57       207

                # of relevant items    :  20
                # of partially relv    :  17
                #  of  not relevant    :  13
                ----------------------------
                total # evaluated      :  50
                #  not evaluated       :  12
                -----------------------------
                total # retrieved      :  62

                       recall          : 0.333
                     precision         : 0.740

                total # of search terms:  12
                total # of commands    :  23
                total # of cycles      :   5

                on-line connect time   : 0.597
                off preparation time   : 0.583
                -----------------------------
                total searching time   : 1.180
```

```
                         Searcher No. 024

QUEST-DBASE    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #
  NUMBER        RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

 004154          60         58         33        151          8         159

                 # of relevant items    :  28
                 # of partially relv    :   8
                 #  of  not relevant    :   5
                 ----------------------------
                 total # evaluated      :  41
                 #  not evaluated       :   1
                 -----------------------------
                 total # retrieved      :  42

                       recall           : 0.305
                      precision         : 0.878

                 total # of search terms:   7
                 total # of commands    :  18
                 total # of cycles      :   6

                 on-line connect time   : 0.194
                 off preparation time   : 0.167
                 -----------------------------
                 total searching time   : 0.361


 008154           2          5         54         61          0          61

                 # of relevant items    :   2
                 # of partially relv    :   3
                 #  of  not relevant    :  34
                 ----------------------------
                 total # evaluated      :  39
                 #  not evaluated       :   0
                 -----------------------------
                 total # retrieved      :  39

                       recall           : 0.714
                      precision         : 0.128

                 total # of search terms:   4
                 total # of commands    :   9
                 total # of cycles      :   2

                 on-line connect time   : 0.065
                 off preparation time   : 0.117
                 -----------------------------
                 total searching time   : 0.182
```

```
                       Searcher No. 024

QUEST-DBASE   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #    TOTAL #
  NUMBER        RELV      PREL      NREL      EVAL      NEVL    RETRIEVED

 010154           4        15       130       149       310        459

                 # of relevant items    :   2
                 # of partially relv    :   0
                 #  of  not relevant    :   3
                 ----------------------------
                 total # evaluated      :   5
                 #  not evaluated       :  14
                 -----------------------------
                 total # retrieved      :  19

                      recall            : 0.105
                     precision          : 0.400

                 total # of search terms:  25
                 total # of commands    :  38
                 total # of cycles      :   5

                 on-line connect time   : 0.525
                 off preparation time   : 0.167
                 -----------------------------
                 total searching time   : 0.692


 011154           9        25       115       149       161        310

                 # of relevant items    :   2
                 # of partially relv    :   6
                 #  of  not relevant    :  15
                 ----------------------------
                 total # evaluated      :  23
                 #  not evaluated       :  22
                 -----------------------------
                 total # retrieved      :  45

                      recall            : 0.235
                     precision          : 0.348

                 total # of search terms:   4
                 total # of commands    :   9
                 total # of cycles      :   1

                 on-line connect time   : 0.071
                 off preparation time   : 0.083
                 -----------------------------
                 total searching time   : 0.154
```

```
                         Searcher No. 024

QUEST-DBASE   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #    TOTAL #
  NUMBER        RELV      PREL      NREL      EVAL      NEVL    RETRIEVED

  015154         28        86        36       150       172        322

                 # of relevant items    :  14
                 # of partially relv    :  25
                 #  of  not relevant    :   5
                 -----------------------------
                 total # evaluated      :  44
                 #  not evaluated       :  63
                 ------------------------------
                 total # retrieved      : 107

                      recall            : 0.342
                     precision          : 0.886

                 total # of search terms:  20
                 total # of commands    :  19
                 total # of cycles      :   1

                 on-line connect time   : 0.178
                 off preparation time   : 0.033
                 ------------------------------
                 total searching time   : 0.211
```

```
                    Searcher No. 025

QUEST-DBASE  TOTAL #  TOTAL #  TOTAL #  TOTAL #  TOTAL #   TOTAL #
  NUMBER      RELV     PREL     NREL     EVAL     NEVL    RETRIEVED

  024191        1        4       30       35        0        35

             # of relevant items    :   0
             # of partially relv    :   0
             #  of  not relevant    :   0
             ---------------------------
             total # evaluated      :   0
             #  not evaluated       :   0
             ----------------------------
             total # retrieved      :   0

                   recall           : 0.000
                  precision         : 0.000

             total # of search terms:   5
             total # of commands    :   8
             total # of cycles      :   3

             on-line connect time   : 0.050
             off preparation time   : 0.167
             ----------------------------
             total searching time   : 0.217


  026038       37       39        8       84        0        84

             # of relevant items    :   9
             # of partially relv    :   2
             #  of  not relevant    :   0
             ---------------------------
             total # evaluated      :  11
             #  not evaluated       :   0
             ----------------------------
             total # retrieved      :  11

                   recall           : 0.145
                  precision         : 1.000

             total # of search terms:   2
             total # of commands    :   4
             total # of cycles      :   1

             on-line connect time   : 0.0036
             off preparation time   : 0.333
             ----------------------------
             total searrrching time   : 0.369
```

```
                         Searcher No. 025

QUEST-DBASE    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #
  NUMBER        RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

  027013         35         69         46        150         58        208

                # of relevant items     :  22
                # of partially relv     :  39
                #  of  not relevant     :  32
                ----------------------------
                total # evaluated       :  93
                #  not evaluated        :  34
                -----------------------------
                total # retrieved       : 127

                       recall           : 0.587
                      precision         : 0.656

                total # of search terms:   5
                total # of commands     :  11
                total # of cycles       :   3

                on-line connect time    : 0.133
                off preparation time    : 0.083
                -----------------------------
                total searching time    : 0.216


  030071         57         25         13         95          0         95

                # of relevant items     :   2
                # of partially relv     :   0
                #  of  not relevant     :   0
                ----------------------------
                total # evaluated       :   2
                #  not evaluated        :   0
                -----------------------------
                total # retrieved       :   2

                       recall           : 0.024
                      precision         : 1.000

                total # of search terms:   5
                total # of commands     :   9
                total # of cycles       :   1

                on-line connect time    : 0.218
                off preparation time    : 0.250
                -----------------------------
                total searching time    : 0.468
```

```
                         Searcher No. 025

QUEST-DBASE   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #    TOTAL #
  NUMBER        RELV      PREL      NREL      EVAL      NEVL    RETRIEVED

  031061         14        15        85       114        0         114

               # of relevant items    :   5
               # of partially relv    :   4
               #  of   not relevant   :  18
               ----------------------------
               total # evaluated      :  27
               #  not evaluated       :   0
               -----------------------------
               total # retrieved      :  27

                     recall           : 0.310
                    precision         : 0.333

               total # of search terms:   3
               total # of commands    :   7
               total # of cycles      :   2

               on-line connect time   : 0.050
               off preparation time   : 0.250
               -----------------------------
               total searching time   : 0.300


  036090         62        49        39       150       57         207

               # of relevant items    :  31
               # of partially relv    :  13
               #  of   not relevant   :  12
               ----------------------------
               total # evaluated      :  56
               #  not evaluated       :   0
               -----------------------------
               total # retrieved      :  56

                     recall           : 0.396
                    precision         : 0.786

               total # of search terms:   8
               total # of commands    :   9
               total # of cycles      :   1

               on-line connect time   : 0.111
               off preparation time   : 0.250
               -----------------------------
               total searching time   : 0.361
```

```
                         Searcher No. 026

QUEST-DBASE   TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #
 NUMBER        RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

 002218         37         36        156        229          0         229

                  # of relevant items     :  16
                  # of partially relv     :   8
                  #  of  not relevant     :  61
                  ---------------------------
                  total # evaluated       :  85
                  #  not evaluated        :   0
                  ----------------------------
                  total # retrieved       :  85

                      recall              : 0.329
                     precision            : 0.282

                  total # of search terms:   3
                  total # of commands     :   3
                  total # of cycles       :   1

                  on-line connect time    : 0.066
                  off preparation time    : 0.167
                  ----------------------------
                  total searching time    : 0.233


 005148         16         23         48         87          1          88

                  # of relevant items     :   1
                  # of partially relv     :   0
                  #  of  not relevant     :   3
                  ---------------------------
                  total # evaluated       :   4
                  #  not evaluated        :   0
                  ----------------------------
                  total # retrieved       :   4

                      recall              : 0.025
                     precision            : 0.250

                  total # of search terms:  13
                  total # of commands     :  19
                  total # of cycles       :   6

                  on-line connect time    : 0.446
                  off preparation time    : 0.500
                  ----------------------------
                  total searching time    : 0.946
```

```
                          Searcher No. 026

QUEST-DBASE   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #
  NUMBER       RELV      PREL      NREL      EVAL      NEVL    RETRIEVED

  007075        70        39        40       149       336       485

              # of relevant items     :   3
              # of partially relv     :   1
              #  of  not relevant     :   1
              ----------------------------
              total # evaluated       :   5
              #  not evaluated        :  13
              -----------------------------
              total # retrieved       :  18

                     recall           : 0.036
                    precision         : 0.800

               total # of search terms:  15
              total # of commands     :  14
              total # of cycles       :   2

              on-line connect time    : 0.355
              off preparation time    : 0.500
              -----------------------------
              total searching time    : 0.855


  013015         7        36       106       149        14       163

              # of relevant items     :   4
              # of partially relv     :  14
              #  of  not relevant     :  37
              ----------------------------
              total # evaluated       :  55
              #  not evaluated        :   7
              -----------------------------
              total # retrieved       :  62

                     recall           : 0.419
                    precision         : 0.327

              total # of seaaarch terms:   6
              total # of commands     :  11
              total # of cycles       :   1

              on-line connect time    : 0.153
              off preparation time    : 0.333
              -----------------------------
              total searching time    : 0.486
```

```
                          Searcher No. 026

QUEST-DBASE   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #
  NUMBER       RELV      PREL      NREL      EVAL      NEVL    RETRIEVED

  014151        35        71        51        157        2        159

                 # of relevant items    :  0
                 # of partially relv    :  1
                 #  of  not relevant    : 32
                 ---------------------------
                 total # evaluated      : 33
                 #  not evaluated       :  0
                 ----------------------------
                 total # retrieved      : 33

                        recall          : 0.009
                      precision         : 0.030

                 total # of search terms:  7
                 total # of commands    : 11
                 total # of cycles      :  2

                 on-line connect time   : 0.158
                 off preparation time   : 0.250
                 ----------------------------
                 total searching time   : 0.408


  018015        66        38        46        150       613       763

                 # of relevant items    :  0
                 # of partially relv    :  0
                 #  of  not relevant    :  0
                 ---------------------------
                 total # evaluated      :  0
                 #  not evaluated       :  1
                 ----------------------------
                 total # retrieved      :  1

                        recall          : 0.000
                      precision         : 0.000

                 total # of search terms: 14
                 total # of commands    : 14
                 total # of cycles      :  2

                 on-line connect time   : 0.286
                 off preparation time   : 0.250
                 ----------------------------
                 total searching time   : 0.536
```

```
                              Searcher No. 027

 QUEST-DBASE    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #     TOTAL #
  NUMBER         RELV       PREL       NREL       EVAL       NEVL      RETRIEVED

  006006          11          5        134        150         88          238

                      # of relevant items     :   0
                      # of partially relv     :   1
                      #  of  not relevant     :  67
                      ----------------------------
                      total # evaluated       :  68
                      #  not evaluated        :  47
                      -----------------------------
                      total # retrieved       : 115

                             recall           : 0.062
                            precision         : 0.014

                      total # of search terms:  11
                      total # of commands     :  15
                      total # of cycles       :   2

                      on-line connect time    : 0.184
                      off preparation time    : 0.083
                      -----------------------------
                      total searching time    : 0.267


  012013           6         21        121        148         90          238

                      # of relevant items     :   1
                      # of partially relv     :   4
                      #  of  not relevant     :   7
                      ----------------------------
                      total # evaluated       :  12
                      #  not evaluated        :   7
                      -----------------------------
                      total # retrieved       :  19

                             recall           : 0.185
                            precision         : 0.417

                      total # of search terms:   8
                      total # of commands     :  14
                      total # of cycles       :   2

                      on-line connect time    : 0.150
                      off preparation time    : 0.333
                      -----------------------------
                      total searching time    : 0.483
```

```
                          Searcher No. 027

QUEST-DBASE    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #     TOTAL #
  NUMBER         RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

  017005          36         26         88        150        377         527

                 # of relevant items     :   4
                 # of partially relv     :   2
                 #  of  not relevant     :  18
                 ----------------------------
                 total # evaluated       :  24
                 #  not evaluated        : 135
                 ------------------------------
                 total # retrieved       : 159

                        recall           : 0.096
                      precision          : 0.250

                 total # of search terms:  16
                 total # of commands     :  18
                 total # of cycles       :   3

                 on-line connect time    : 0.286
                 off preparation time    : 0.167
                 ------------------------------
                 total searching time    : 0.453


  022108          15        135          0        150        365         515

                 # of relevant items     :   6
                 # of partially relv     :  60
                 #  of  not relevant     :   0
                 ----------------------------
                 total # evaluated       :  66
                 #  not evaluated        :  68
                 ------------------------------
                 total # retrieved       : 134

                        recall           : 0.440
                      precision          : 1.000

                 total # of search terms:   7
                 total # of commands     :  13
                 total # of cycles       :   1

                 on-line connect time    : 0.213
                 off preparation time    : 0.250
                 ------------------------------
                 total searching time    : 0.463
```

```
                          Searcher No. 027

QUEST-DBASE   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #
  NUMBER        RELV      PREL      NREL      EVAL      NEVL    RETRIEVED

 027013          35        69        46       150        58       208


                # of relevant items     :   8
                # of partially relv     :  12
                #  of  not relevant     :  11
                -----------------------------
                total # evaluated       :  31
                #  not evaluated        :   7
                ------------------------------
                total # retrieved       :  38

                       recall           : 0.192
                      precision         : 0.645

                total # of search terms:   7
                total # of commands     :  11
                total # of cycles       :   1

                on-line connect time    : 0.157
                off preparation time    : 0.083
                ------------------------------
                total searching time    : 0.240


 029008          36        34        80       150        77       227


                # of relevant items     :  15
                # of partially relv     :  13
                #  of  not relevant     :  50
                -----------------------------
                total # evaluated       :  78
                #  not evaluated        :  23
                ------------------------------
                total # retrieved       : 101

                       recall           : 0.400
                      precision         : 0.359

                total # of search terms:  15
                total # of commands     :  19
                total # of cycles       :   7

                on-line connect time    : 0.161
                off preparation time    : 0.250
                ------------------------------
                total searching time    : 0.411
```

```
                         Searcher No. 028

QUEST-DBASE   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #
  NUMBER       RELV      PREL      NREL      EVAL      NEVL    RETRIEVED

  004154        60        58        33       151        8        159

                 # of relevant items    :   5
                 # of partially relv    :   0
                 #  of  not relevant    :   4
                 ----------------------------
                 total # evaluated      :   9
                 #  not evaluated       :   1
                 -----------------------------
                 total # retrieved      :  10

                       recall           : 0.042
                      precision         : 0.556

                 total # of search terms:  13
                 total # of commands    :  14
                 total # of cycles      :   3

                 on-line connect time   : 0.148
                 off preparation time   : 0.250
                 -----------------------------
                 total searching time   : 0.398


  008154         2         5        54        61        0         61

                 # of relevant items    :   0
                 # of partially relv    :   0
                 #  of  not relevant    :   3
                 ----------------------------
                 total # evaluated      :   3
                 #  not evaluated       :   0
                 -----------------------------
                 total # retrieved      :   3

                       recall           : 0.000
                      precision         : 0.000

                 total # of search terms:   4
                 total # of commands    :   5
                 total # of cycles      :   1

                 on-line connect time   : 0.113
                 off preparation time   : 0.250
                 -----------------------------
                 total searching time   : 0.363
```

```
                         Searcher No. 028

QUEST-DBASE    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #
 NUMBER         RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

010154            4         15        130        149        310        459

               # of relevant items    :   0
               # of partially relv    :   0
               #  of  not relevant    :   4
               ----------------------------
               total # evaluated      :   4
               #  not evaluated       :  18
               -----------------------------
               total # retrieved      :  22

                      recall          : 0.000
                    precision         : 0.000

               total # of search terms:   9
               total # of commands    :  11
               total # of cycles      :   3

               on-line connect time   : 0.139
               off preparation time   : 0.250
               -----------------------------
               total searching time   : 0.389


011154            9         25        115        149        161        310

               # of relevant items    :   2
               # of partially relv    :   6
               #  of  not relevant    :  19
               ----------------------------
               total # evaluated      :  27
               #  not evaluated       :  27
               -----------------------------
               total # retrieved      :  54

                      recall          : 0.235
                    precision         : 0.296

               total # of search terms:  13
               total # of commands    :  12
               total # of cycles      :   3

               on-line connect time   : 0.263
               off preparation time   : 0.333
               -----------------------------
               total searching time   : 0.596
```

```
                         Searcher No. 028

QUEST-DBASE   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #
  NUMBER        RELV      PREL      NREL      EVAL      NEVL   RETRIEVED

  015154        28        86        36       150       172       322

                 # of relevant items    :  22
                 # of partially relv    :  41
                 #  of  not relevant    :  12
                 -----------------------------
                 total # evaluated      :  75
                 #  not evaluated       : 105
                 ------------------------------
                 total # retrieved      : 180

                        recall          : 0.553
                       precision        : 0.840

                 total # of search terms:   6
                 total # of commands    :   7
                 total # of cycles      :   1

                 on-line connect time   : 0.227
                 off preparation time   : 0.117
                 ------------------------------
                 total searching time   : 0.344
```

```
                              Searcher No. 029

QUEST-DBASE   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #    TOTAL #
  NUMBER       RELV      PREL      NREL      EVAL      NEVL     RETRIEVED

  012013         6        21        121       148        90        238

                    # of relevant items    :   0
                    # of partially relv    :   4
                    #  of  not relevant    :   5
                    ----------------------------
                    total # evaluated      :   9
                    #  not evaluated       :   4
                    -----------------------------
                    total # retrieved      :  13

                           recall          : 0.148
                         precision         : 0.444

                    total # of search terms:   4
                    total # of commands    :   7
                    total # of cycles      :   2

                    on-line connect time   : 0.151
                    off preparation time   : 0.583
                    -----------------------------
                    total searching time   : 0.734


  032008       113        19        18        150       298        448

                    # of relevant items    :  34
                    # of partially relv    :   4
                    #  of  not relevant    :   0
                    ----------------------------
                    total # evaluated      :  38
                    #  not evaluated       : 112
                    -----------------------------
                    total # retrieved      : 150

                           recall          : 0.288
                         precision         : 1.000

                    total # of search terms:   6
                    total # of commands    :  24
                    total # of cycles      :  10

                    on-line connect time   : 0.744
                    off preparation time   : 0.667
                    -----------------------------
                    total searching time   : 1.411
```

```
                              Searcher No. 029

QUEST-DBASE    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #
  NUMBER        RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

  033008         44         57         49        150        123        273

                  # of relevant items    :   1
                  # of partially relv    :   0
                  #  of  not relevant    :   0
                  ----------------------------
                  total # evaluated      :   1
                  #  not evaluated       :   1
                  ------------------------------
                  total # retrieved      :   2

                         recall          : 0.009
                       precision         : 1.000

                  total # of search terms:   3
                  total # of commands    :   8
                  total # of cycles      :   2

                  on-line connect time   : 0.192
                  off preparation time   : 0.417
                  ------------------------------
                  total searching time   : 0.609


  034013         10         39        100        149        207        356

                  # of relevant items    :   1
                  # of partially relv    :  13
                  #  of  not relevant    :   7
                  ----------------------------
                  total # evaluated      :  21
                  #  not evaluated       :   0
                  ------------------------------
                  total # retrieved      :  21

                         recall          : 0.286
                       precision         : 0.667

                  total # of search terms:   5
                  total # of commands    :   5
                  total # of cycles      :   2

                  on-line connect time   : 0.069
                  off preparation time   : 0.417
                  ------------------------------
                  total searching time   : 0.486
```

```
                              Searcher No. 029

QUEST-DBASE    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #     TOTAL #
  NUMBER         RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

  035154          31         20         14         65         0          65

                    # of relevant items    :  12
                    # of partially relv    :   4
                    #  of  not relevant    :   6
                    ---------------------------
                    total # evaluated      :  22
                    #  not evaluated       :   0
                    ----------------------------
                    total # retrieved      :  22

                           recall          : 0.314
                          precision        : 0.727

                    total # of search terms:  10
                    total # of commands    :  14
                    total # of cycles      :   3

                    on-line connect time   : 0.219
                    off preparation time   : 0.250
                    ----------------------------
                    total searching time   : 0.469
```

```
                         Searcher No. 030

QUEST-DBASE    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #     TOTAL #
  NUMBER        RELV       PREL       NREL       EVAL       NEVL      RETRIEVED

 023032          29          9         51         89          0          89

                # of relevant items      :   1
                # of partially relv      :   1
                #  of  not relevant      :   4
                ---------------------------
                total # evaluated        :   6
                #  not evaluated         :   0
                ----------------------------
                total # retrieved        :   6

                      recall             : 0.052
                    precision            : 0.333

                total # of search terms:     4
                total # of commands      :  12
                total # of cycles        :   4

                on-line connect time     : 0.147
                off preparation time     : 0.033
                ----------------------------
                total searching time     : 0.180


 037016          78         18         54        150         69         219

                # of relevant items      :   3
                # of partially relv      :   0
                #  of  not relevant      :   2
                ---------------------------
                total # evaluated        :   5
                #  not evaluated         :   0
                ----------------------------
                total # retrieved        :   5

                      recall             : 0.031
                    precision            : 0.600

                total # of search terms:    17
                total # of commands      :  39
                total # of cycles        :   9

                on-line connect time     : 0.869
                off preparation time     : 0.333
                ----------------------------
                total searching time     : 1.202
```

```
                              Searcher No. 030

QUEST-DBASE     TOTAL #     TOTAL #     TOTAL #     TOTAL #     TOTAL #     TOTAL #
  NUMBER          RELV        PREL        NREL        EVAL        NEVL      RETRIEVED

  038061           79          29          42         150         595         745

                    # of relevant items    :   6
                    # of partially relv    :   9
                    #  of  not relevant    :  19
                    -----------------------------
                    total # evaluated      :  34
                    #  not evaluated       : 240
                    ------------------------------
                    total # retrieved      : 274

                           recall          : 0.139
                         precision         : 0.441

                    total # of search terms:  10
                    total # of commands    :  20
                    total # of cycles      :   5

                    on-line connect time   : 0.312
                    off preparation time   : 0.417
                    ------------------------------
                    total searching time   : 0.729


  039015           26          38         102         166           0         166

                    # of relevant items    :   4
                    # of partially relv    :   3
                    #  of  not relevant    :   7
                    -----------------------------
                    total # evaluated      :  14
                    #  not evaluated       :   0
                    ------------------------------
                    total # retrieved      :  14

                           recall          : 0.109
                         precision         : 0.500

                    total # of search terms:  12
                    total # of commands    :  13
                    total # of cycles      :   3

                    on-line connect time   : 0.291
                    off preparation time   : 0.583
                    ------------------------------
                    total searching time   : 0.874
```

Searcher No. 030

QUEST-DBASE NUMBER	TOTAL # RELV	TOTAL # PREL	TOTAL # NREL	TOTAL # EVAL	TOTAL # NEVL	TOTAL # RETRIEVED
040016	77	40	32	149	331	480

```
# of relevant items     :   2
# of partially relv     :   4
#  of  not relevant     :  32
----------------------------
total # evaluated       :  38
#  not evaluated        :   4
-----------------------------
total # retrieved       :  42

      recall            : 0.051
     precision          : 0.158

total # of search terms:  15
total # of commands     :  13
total # of cycles       :   3

on-line connect time    : 0.293
off preparation time    : 0.500
-----------------------------
total searching time    : 0.793
```

```
                         Searcher No. 032

QUEST-DBASE    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #
  NUMBER         RELV       PREL       NREL       EVAL       NEVL    RETRIEVED

  020015          26         43         81        150        161        311


                  # of relevant items     :   2
                  # of partially relv     :   2
                  #  of  not relevant     :   6
                  ----------------------------
                  total # evaluated       :  10
                  #  not evaluated        :   8
                  -----------------------------
                  total # retrieved       :  18

                        recall            : 0.058
                       precision          : 0.400

                  total # of search terms:    4
                  total # of commands     :  10
                  total # of cycles       :   2

                  on-line connect time    : 0.133
                  off preparation time    : 0.083
                  -----------------------------
                  total searching time    : 0.216


  022108          15        135          0        150        365        515

                  # of relevant items     :   1
                  # of partially relv     :   5
                  #  of  not relevant     :   0
                  ----------------------------
                  total # evaluated       :   6
                  #  not evaluated        :   8
                  -----------------------------
                  total # retrieved       :  14

                        recall            : 0.040
                       precision          : 1.000

                  total # of search terms:    8
                  total # of commands     :   9
                  total # of cycles       :   2

                  on-line connect time    : 0.174
                  off preparation time    : 0.083
                  -----------------------------
                  total searching time    : 0.257
```

```
                         Searcher No. 032

QUEST-DBASE   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #
  NUMBER        RELV      PREL      NREL      EVAL      NEVL    RETRIEVED

  032008        113        19        18       150       298       448

               # of relevant items    :  58
               # of partially relv    :   2
               #  of  not relevant    :   0
               ----------------------------
               total # evaluated      :  60
               #  not evaluated       : 119
               -----------------------------
               total # retrieved      : 179

                      recall          : 0.455
                     precision        : 1.000

               total # of search terms:   6
               total # of commands      :   7
               total # of cycles      :   3

               on-line connect time   : 0.163
               off preparation time   : 0.083
               -----------------------------
               total searching time   : 0.246


  033008         44        57        49       150       123       273

               # of relevant items    :  15
               # of partially relv    :  26
               #  of  not relevant    :   6
               ----------------------------
               total # evaluated      :  47
               #  not evaluated       :  38
               -----------------------------
               total # retrieved      :  85

                      recall          : 0.406
                     precision        : 0.872

               total # of search terms:   6
               total # of commands    :  13
               total # of cycles      :   4

               on-line connect time   : 0.217
               off preparation time   : 0.083
               -----------------------------
               total searching time   : 0.300
```

```
                        Searcher No. 032

QUEST-DBASE   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #    TOTAL #
  NUMBER        RELV      PREL      NREL      EVAL      NEVL    RETRIEVED

  034013         10        39       100       149       207       356


               # of relevant items    :   0
               # of partially relv    :   1
               #  of  not relevant    :   0
               ----------------------------
               total # evaluated      :   1
               #  not evaluated       :   0
               -----------------------------
               total # retrieved      :   1

                     recall           : 0.020
                    precision         : 1.000

               total # of search terms:   6
               total # of commands    :  12
               total # of cycles      :   5

               on-line connect time   : 0.211
               off preparation time   : 0.083
               -----------------------------
               total searching time   : 0.294


  035154         31        20        14        65         0        65


               # of relevant items    :   9
               # of partially relv    :  10
               #  of  not relevant    :   3
               ----------------------------
               total # evaluated      :  22
               #  not evaluated       :   0
               -----------------------------
               total # retrieved      :  22

                     recall           : 0.373
                    precision         : 0.864

               total # of search terms:   6
               total # of commands    :  15
               total # of cycles      :   5

               on-line connect time   : 0.184
               off preparation time   : 0.083
               -----------------------------
               total searching time   : 0.267
```

```
                                   Searcher No. 033

QUEST-DBASE     TOTAL #     TOTAL #     TOTAL #     TOTAL #     TOTAL #     TOTAL #
  NUMBER          RELV        PREL        NREL        EVAL        NEVL     RETRIEVED

  002218           37          36         156         229          0          229


                         # of relevant items    :   1
                         # of partially relv    :   1
                         #  of  not relevant    :  17
                         ----------------------------
                         total # evaluated      :  19
                         #  not evaluated       :   0
                         -----------------------------
                         total # retrieved      :  19

                               recall           : 0.027
                              precision         : 0.105

                         total # of search terms:  16
                         total # of commands    :  23
                         total # of cycles      :   6

                         on-line connect time   : 0.231
                         off preparation time   : 0.133
                         -----------------------------
                         total searching time   : 0.364


  003064           36          47          68         151        272          423


                         # of relevant items    :   0
                         # of partially relv    :   2
                         #  of  not relevant    :   0
                         ----------------------------
                         total # evaluated      :   2
                         #  not evaluated       :   3
                         -----------------------------
                         total # retrieved      :   5

                               recall           : 0.024
                              precision         : 1.000

                         total # of search terms:  11
                         total # of commands    :  16
                         total # of cycles      :   4

                         on-line connect time   : 0.167
                         off preparation time   : 0.100
                         -----------------------------
                         total searching time   : 0.267
                         Searcher No. 033

QUEST-DBASE    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #     TOTAL #
  NUMBER        RELV       PREL       NREL       EVAL       NEVL      RETRIEVED

  009037         18         48         84        150        495         645

                 # of relevant items    :  1
                 # of partially relv    :  5
                 #  of  not relevant    :  0
                 -----------------------------
                 total # evaluated      :  6
                 #  not evaluated       :  26
                 ------------------------------
                 total # retrieved      :  32

                        recall          : 0.090
                       precision        : 1.000

                 total # of search terms:  11
                 total # of commands    :   9
                 total # of cycles      :   3

                 on-line connect time   : 0.143
                 off preparation time   : 0.066
                 ------------------------------
                 total searching time   : 0.209


  014151         35         71         51        157          2         159

                 # of relevant items    :  24
                 # of partially relv    :  50
                 #  of  not relevant    :  14
                 -----------------------------
                 total # evaluated      :  88
                 #  not evaluated       :   1
                 ------------------------------
                 total # retrieved      :  89

                        recall          : 0.698
                       precision        : 0.841

                 total # of search terms:  11
                 total # of commands    :  10
                 total # of cycles      :   4

                 on-line connect time   : 0.138
                 off preparation time   : 0.066
                 ------------------------------
                 total searching time   : 0.204
```

```
                         Searcher No. 033

QUEST-DBASE    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #
  NUMBER        RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

  021037         19          6         77         102         0         102

                   # of relevant items    :  11
                   # of partially relv    :   3
                   #  of  not relevant    :  31
                   ----------------------------
                   total # evaluated      :  45
                   #  not evaluated       :   0
                   -----------------------------
                   total # retrieved      :  45

                          recall          : 0.560
                        precision         : 0.311

                   total # of search terms:  14
                   total # of commands    :  20
                   total # of cycles      :   6

                   on-line connect time   : 0.220
                   off preparation time   : 0.066
                   -----------------------------
                   total searching time   : 0.286


  025001         30         26         94         150       430         580

                   # of relevant items    :   0
                   # of partially relv    :   0
                   #  of  not relevant    :   0
                   ----------------------------
                   total # evaluated      :   0
                   #  not evaluated       :   1
                   -----------------------------
                   total # retrieved      :   1

                          recall          : 0.000
                        precision         : 0.000

                   total # of search terms:  16
                   total # of commands    :  15
                   total # of cycles      :   5

                     on-line connect time   : 0.224
                   off preparation time   : 0.083
                   -----------------------------
                   total searching time   : 0.307
```

```
                          Searcher No. 034

QUEST-DBASE    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #
  NUMBER        RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

  023032         29          9         51         89          0         89


                   # of relevant items    :  16
                   # of partially relv    :   2
                   #  of  not relevant    :   6
                    ----------------------------
                   total # evaluated      :  24
                   #  not evaluated       :   0
                   ----------------------------
                   total # retrieved      :  24

                         recall           : 0.474
                        precision         : 0.750

                   total # of search terms:   8
                   total # of commands    :  11
                   total # of cycles      :   3

                   on-line connect time   : 0.183
                   off preparation time   : 0.083
                   ----------------------------
                   total searching time   : 0.266


  028038          5         23         39         67          0         67

                   # of relevant items    :   1
                   # of partially relv    :   1
                   #  of  not relevant    :  12
                   ---------------------------
                   total # evaluated      :  14
                   #  not evaluated       :   0
                   ----------------------------
                   total # retrieved      :  14

                         recall           : 0.071
                        precision         : 0.143

                   total # of search terms:   8
                   total # of commands    :  31
                   total # of cycles      :   7

                   on-line connect time   : 0.212
                   off preparation time   : 0.083
                   ----------------------------
                   total searching time   : 0.295
```

```
                              Searcher No. 034

QUEST-DBASE     TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #
  NUMBER          RELV       PREL       NREL       EVAL       NEVL    RETRIEVED

 037016            78         18         54        150         69        219

                    # of relevant items    :  16
                    # of partially relv    :   1
                    #  of  not relevant    :   6
                    ----------------------------
                    total # evaluated      :  23
                    #  not evaluated       :   2
                    -----------------------------
                    total # retrieved      :  25

                           recall          : 0.177
                          precision        : 0.739

                    total # of search terms:   7
                    total # of commands    :  25
                    total # of cycles      :   4

                    on-line connect time   : 0.220
                    off preparation time   : 0.167
                    -----------------------------
                    total searching time   : 0.387


 038061            79         29         42        150        595        745

                    # of relevant items    :   8
                    # of partially relv    :   1
                    #  of  not relevant    :   4
                    ----------------------------
                    total # evaluated      :  13
                    #  not evaluated       :  32
                    -----------------------------
                    total # retrieved      :  45

                           recall          : 0.083
                          precision        : 0.692

                    total # of search terms:   4
                    total # of commands    :  32
                    total # of cycles      :   6

                    on-line connect time   : 0.303
                    off preparation time   : 0.083
                    -----------------------------
                    total searching time   : 0.386
```

```
                          Searcher No. 034

QUEST-DBASE   TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #     TOTAL #
  NUMBER        RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

  039015         26         38        102        166          0         166

                   # of relevant items    :   2
                   # of partially relv    :   5
                   #  of  not relevant    :   5
                   -----------------------------
                   total # evaluated      :  12
                   #  not evaluated       :   0
                   ------------------------------
                   total # retrieved      :  12

                          recall          : 0.109
                        precision         : 0.583

                   total # of search terms:   7
                   total # of commands    :  17
                   total # of cycles      :   4

                   on-line connect time   : 0.183
                   off preparation time   : 0.083
                   ------------------------------
                   total searching time   : 0.266


  040016         77         40         32        149        331         480

                   # of relevant items    :   6
                   # of partially relv    :   2
                   #  of  not relevant    :   0
                   -----------------------------
                   total # evaluated      :   8
                   #  not evaluated       :   7
                   ------------------------------
                   total # retrieved      :  15

                          recall          : 0.068
                        precision         : 1.000

                   total # of search terms:  10
                   total # of commands    :  32
                   total # of cycles      :   8

                   on-line connect time   : 0.367
                   off preparation time   : 0.250
                   ------------------------------
                   total searching time   : 0.617
```

```
                          Searcher No. 035

QUEST-DBASE    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #
  NUMBER        RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

 023032          29          9         51         89          0         89

                  # of relevant items    :   3
                  # of partially relv    :   4
                  #  of  not relevant    :  28
                  ---------------------------
                  total # evaluated      :  35
                  #  not evaluated       :   0
                  ----------------------------
                  total # retrieved      :  35

                        recall           : 0.184
                       precision         : 0.200

                  total # of search terms:   6
                  total # of commands    :   8
                  total # of cycles      :   3

                  on-line connect time   : 0.117
                  off preparation time   : 0.167
                  ----------------------------
                  total searching time   : 0.284


 037016          78         18         54        150         69        219

                  # of relevant items    :  29
                  # of partially relv    :   1
                  #  of  not relevant    :   6
                  ---------------------------
                  total # evaluated      :  36
                  #  not evaluated       :  19
                  ----------------------------
                  total # retrieved      :  55

                        recall           : 0.313
                       precision         : 0.833

                  total # of search terms:   9
                  total # of commands    :  17
                  total # of cycles      :   5

                  on-line connect time   : 0.252
                  off preparation time   : 0.083
                  ----------------------------
                  total searching time   : 0.335
```

```
                         Searcher No. 035

QUEST-DBASE    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #
  NUMBER        RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

038061           79         29         42        150        595        745

                   # of relevant items     :   6
                   # of partially relv     :   2
                   #  of  not relevant     :   2
                   ----------------------------
                   total # evaluated       :  10
                   #  not evaluated        :  15
                   -----------------------------
                   total # retrieved       :  25

                          recall           : 0.07774
                       precision           : 0.800

                   total # of search terms:  13
                   total # of commands     :  19
                   total # of cycles       :   4

                   on-line connect time    : 0.278
                   off preparation time    : 0.083
                   -----------------------------
                   total searching time    : 0.361


039015           26         38        102        166          0        166

                   # of relevant items     :   0
                   # of partially relv     :   0
                   #  of  not relevant     :   6
                   ----------------------------
                   total # evaluated       :   6
                   #  not evaluated        :   0
                   -----------------------------
                   total # retrieved       :   6

                          recall           : 0.000
                       precision           : 0.000

                   total # of search terms:  12
                   total # of commands     :  16
                   total # of cycles       :   5

                   on-line connect time    : 0.317
                   off preparation time    : 0.333
                   -----------------------------
                   total searching time    : 0.650
```

```
                          Searcher No. 035

QUEST-DBASE    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #     TOTAL #
  NUMBER         RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

  040016          77         40         32        149        331         480

                  # of relevant items    :  11
                  # of partially relv    :   4
                  #  of  not relevant    :   0
                  ----------------------------
                  total # evaluated      :  15
                  #  not evaluated       :  47
                  -----------------------------
                  total # retrieved      :  62

                         recall          : 0.128
                       precision         : 1.000

                  total # of search terms:   6
                  total # of commands    :  14
                  total # of cycles      :   6

                  on-line connect time   : 0.257
                  off preparation time   : 0.083
                  -----------------------------
                  total searching time   : 0.340
```

```
                         Searcher No. 036

QUEST-DBASE   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #
  NUMBER       RELV      PREL      NREL      EVAL      NEVL     RETRIEVED

  024191         1         4        30        35         0        35

                  # of relevant items    :   1
                  # of partially relv    :   2
                  #  of  not relevant    :   8
                  ---------------------------
                  total # evaluated      :  11
                  #  not evaluated       :   0
                  -----------------------------
                  total # retrieved      :  11

                       recall            : 0.600
                     precision           : 0.273

                  total # of search terms:  17
                  total # of commands    :  14
                  total # of cycles      :   3

                  on-line connect time   : 0.362
                  off preparation time   : 0.117
                  -----------------------------
                  total searching time   : 0.479


  026038        37        39         8        84         0        84

                  # of relevant items    :   1
                  # of partially relv    :   1
                  #  of  not relevant    :   0
                  ---------------------------
                  total # evaluated      :   2
                  #  not evaluated       :   0
                  -----------------------------
                  total # retrieved      :   2

                       recall            : 0.026
                     precision           : 1.000

                  total # of search terms:   9
                  total # of commands    :   8
                  total # of cycles      :   2

                  on-line connect time   : 0.195
                  off preparation time   : 0.300
                  -----------------------------
                  total searching time   : 0.495
```

```
                          Searcher No. 036

QUEST-DBASE   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #
  NUMBER        RELV      PREL      NREL      EVAL      NEVL    RETRIEVED
  028038         5         23        39        67        0          67

              # of relevant items     :   0
              # of partially relv     :   0
              #  of  not relevant     :   0
              ----------------------------
              total # evaluated       :   0
              #  not evaluated        :   0
              -----------------------------
              total # retrieved       :   0

                    recall            : 0.000
                   precision          : 0.000

              total # of search terms:  11
              total # of commands     :  11
              total # of cycles       :   2

              on-line connect time    : 0.265
              off preparation time    : 0.167
              -----------------------------
              total searching time    : 0.432


  030071        57         25        13        95        0          95

              # of relevant items     :   1
              # of partially relv     :   0
              #  of  not relevant     :   0
              ----------------------------
              total # evaluated       :   1
              #  not evaluated        :   0
              -----------------------------
              total # retrieved       :   1

                    recall            : 0.012
                   precision          : 1.000

              total # of search terms:  15
              total # of commands     :  11
              total # of cycles       :   3

              on-line connect time    : 0.257
              off preparation time    : 0.483
              -----------------------------
              total searching time    : 0.740
```

```
                        Searcher No. 036

QUEST-DBASE    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #
  NUMBER         RELV       PREL       NREL       EVAL       NEVL    RETRIEVED

  031061         14         15         85         114         0         114

                    # of relevant items    :   3
                    # of partially relv    :   0
                    #  of  not relevant    :   8
                    ----------------------------
                    total # evaluated      :  11
                    #  not evaluated       :   0
                    -----------------------------
                    total # retrieved      :  11

                           recall          : 0.103
                          precision        : 0.273

                    total # of search terms:   4
                    total # of commands    :   4
                    total # of cycles      :   2

                    on-line connect time   : 0.104
                    off preparation time   : 0.233
                    -----------------------------
                    total searching time   : 0.337


  036090         62         49         39         150        57         207

                    # of relevant items    :  28
                    # of partially relv    :   9
                    #  of  not relevant    :  10
                    ----------------------------
                    total # evaluated      :  47
                    #  not evaluated       :   0
                    -----------------------------
                    total # retrieved      :  47

                           recall          : 0.333
                          precision        : 0.7787

                    total # of search terms:   4
                    total # of commands    :   7
                    total # of cycles      :   2

                    on-line connect time   : 0.157
                    off preparation time   : 0.083
                    -----------------------------
                    total searching time   : 0.240
```

```
                         Searcher No. 037

QUEST-DBASE   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #    TOTAL #
  NUMBER       RELV      PREL      NREL      EVAL      NEVL     RETRIEVED

  004154        60        58        33        151        8         159


                # of relevant items     :  12
                # of partially relv     :  12
                #  of  not relevant     :  10
                ----------------------------
                total # evaluated       :  34
                #  not evaluated        :   2
                ------------------------------
                total # retrieved       :  36

                      recall            : 0.203
                     precision          : 0.706

                total # of search terms:   5
                total # of commands     :  12
                total # of cycles       :   5

                on-line connect time    : 0.168
                off preparation time    : 0.066
                ------------------------------
                total searching time    : 0.234


  008154         2         5        54        61         0          61

                # of relevant items     :   2
                # of partially relv     :   0
                #  of  not relevant     :  11
                ----------------------------
                total # evaluated       :  13
                  #  not evaluated        :   0
                ------------------------------
                total # retrieved       :  13

                      recall            : 0.286
                     precision          : 0.154

                total # of search terms:   4
                total # of commands     :  14
                total # of cycles       :   4

                on-line connect time    : 0.111
                off preparation time    : 0.133
                ------------------------------
                total searching time    : 0.244
```

```
                              Searcher No. 037

QUEST-DBASE     TOTAL #     TOTAL #     TOTAL #     TOTAL #     TOTAL #     TOTAL #
  NUMBER          RELV        PREL        NREL        EVAL        NEVL     RETRIEVED

 010154             4          15         130         149         310         459

                 # of relevant items     :  2
                 # of partially relv     :  1
                 #  of  not relevant     :  2
                 -----------------------------
                 total # evaluated       :  5
                 #  not evaluated        : 13
                 ------------------------------
                 total # retrieved       : 18

                       recall            : 0.158
                      precision          : 0.600

                 total # of search terms:   7
                 total # of commands     :  10
                 total # of cycles       :   2

                 on-line connect time    : 0.136
                 off preparation time    : 0.200
                 ------------------------------
                 total searching time    : 0.336


 011154             9          25         115         149         161         310

                 # of relevant items     :   0
                 # of partially relv     :   1
                 #  of  not relevant     :   1
                 -----------------------------
                 total # evaluated       :   2
                 #  not evaluated        :   3
                 ------------------------------
                 total # retrieved       :   5

                       recall            : 0.029
                      precision          : 0.500

                 total # of search terms:    8
                 total # of commands     :   9
                 total # of cycles       :   3

                 on-line connect time    : 0.083
                 off preparation time    : 0.167
                 ------------------------------
                 total searching time    : 0.250
```

```
                         Searcher No. 037

QUEST-DBASE    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #
  NUMBER        RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

  015154         28         86         36        150        172        322

                   # of relevant items    :  13
                   # of partially relv    :  21
                   #  of  not relevant    :   9
                   ----------------------------
                   total # evaluated      :  43
                   #  not evaluated       :  52
                   -----------------------------
                   total # retrieved      :  95

                          recall          : 0.298
                         precision        : 0.791

                   total # of search terms:   3
                   total # of commands    :   9
                   total # of cycles      :   2

                   on-line connect time   : 0.234
                   off preparation time   : 0.133
                   -----------------------------
                   total searching time   : 0.367
```

```
                              Searcher No. 038

QUEST-DBASE    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #
  NUMBER        RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

  006006         11          5         134        150         88        238


                    # of relevant items    :   0
                    # of partially relv    :   0
                    #  of  not relevant    :   2
                    -----------------------------
                    total # evaluated      :   2
                    #  not evaluated       :   1
                    ------------------------------
                    total # retrieved      :   3

                           recall          : 0.000
                          precision        : 0.000

                    total # of search terms:  13
                    total # of commands    :  18
                    total # of cycles      :   4

                    on-line connect time   : 0.036
                    off preparation time   : 0.250
                    ------------------------------
                    total searching time   : 0.286


  017005         36         26          88        150        377        527


                    # of relevant items    :   0
                    # of partially relv    :   1
                    #  of  not relevant    :   0
                    -----------------------------
                    total # evaluated      :   1
                    #  not evaluated       :   0
                    ------------------------------
                    total # retrieved      :   1

                           recall          : 0.016
                          precision        : 1.000

                    total # of search terms:   9
                    total # of commands    :  13
                    total # of cycles      :   3

                    on-line connect time   : 0.095
                    off preparation time   : 0.217
                    ------------------------------
                    total searching time   : 0.312
```

```
                        Searcher No. 038

QUEST-DBASE   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #
  NUMBER       RELV      PREL      NREL      EVAL      NEVL    RETRIEVED

 022108         15        135        0        150       365       515


              # of relevant items    :   1
              # of partially relv    :   5
              #  of  not relevant    :   0
              ---------------------------
              total # evaluated      :   6
              #  not evaluated       :  11
              ----------------------------
              total # retrieved      :  17

                    recall           : 0.040
                  precision          : 1.000

              total # of search terms:  10
              total # of commands    :  18
              total # of cycles      :   6

              on-line connect time   : 0.148
              off preparation time   : 0.167
              ----------------------------
              total searching time   : 0.315


 029008         36         34       80        150        77       227


              # of relevant items    :   3
              # of partially relv    :   1
              #  of  not relevant    :   1
              ---------------------------
              total # evaluated      :   5
              #  not evaluated       :   3
              ----------------------------
              total # retrieved      :   8

                    recall           : 0.057
                  precision          : 0.800

              total # of search terms:   9
              total # of commands    :  17
              total # of cycles      :   6

              on-line connect time   : 0.326
              off preparation time   : 0.167
              ----------------------------
              total searching time   : 0.493
```

```
                              Searcher No. 039

QUEST-DBASE    TOTAL #     TOTAL #     TOTAL #     TOTAL #     TOTAL #     TOTAL #
  NUMBER        RELV        PREL        NREL        EVAL        NEVL      RETRIEVED

  006006         11           5          134         150          88         238

                      # of relevant items    :   2
                      # of partially relv    :   4
                      #  of  not relevant    :  39
                      ----------------------------
                      total # evaluated      :  45
                      #  not evaluated       :  20
                      ------------------------------
                      total # retrieved      :  65

                            recall           : 0.375
                          precision          : 0.133

                      total # of search terms:  10
                      total # of commands    :  21
                      total # of cycles      :   6

                      on-line connect time   : 0.250
                      off preparation time   : 0.250
                      ------------------------------
                      total searching time   : 0.500


  017005         36          26           88         150         377         527

                      # of relevant items    :  22
                      # of partially relv    :   9
                      #  of  not relevant    :   8
                      ----------------------------
                      total # evaluated      :  39
                      #  not evaluated       :  94
                      ------------------------------
                      total # retrieved      : 133

                            recall           : 0.500
                          precision          : 0.795

                      total # of search terms:  12
                      total # of commands    :  18
                      total # of cycles      :   3

                      on-line connect time   : 0.301
                      off preparation time   : 0.250
                      ------------------------------
                      total searching time   : 0.551
```

```
                         Searcher No. 039

QUEST-DBASE   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #    TOTAL #
  NUMBER        RELV      PREL      NREL      EVAL      NEVL    RETRIEVED

  022108         15        135        0        150       365       515


                # of relevant items    :   0
                # of partially relv    :   6
                #  of  not relevant    :   0
                ---------------------------
                total # evaluated      :   6
                #  not evaluated       :  64
                ----------------------------
                total # retrieved      :  70

                      recall           : 0.040
                     precision         : 1.000

                total # of search terms:   9
                total # of commands    :  26
                total # of cycles      :   6

                on-line connect time   : 0.306
                off preparation time   : 0.250
                ----------------------------
                total searching time   : 0.556


  029008         36         34       80        150        77       227

                # of relevant items    :   5
                # of partially relv    :   3
                #  of  not relevant    :   2
                ---------------------------
                total # evaluated      :  10
                #  not evaluated       :   5
                ----------------------------
                total # retrieved      :  15

                      recall           : 0.114
                     precision         : 0.800

                total # of search terms:   9
                total # of commands    :  25
                total # of cycles      :   6

                on-line connect time   : 0.268
                off preparation time   : 0.250
                ----------------------------
                total searching time   : 0.518
```

```
                              Searcher No. 040

QUEST-DBASE    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #
  NUMBER        RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

  006006         11          5         134        150         88        238

                    # of relevant items    :   0
                    # of partially relv    :   0
                    #  of  not relevant    :   4
                    ---------------------------
                    total # evaluated      :   4
                    #  not evaluated       :   0
                    ----------------------------
                    total # retrieved      :   4

                           recall          : 0.000
                          precision        : 0.000

                    total # of search terms:  13
                    total # of commands    :  38
                    totall # of cycles      :  13

                    on-line connect time   : 0.670
                    off preparation time   : 0.117
                    ----------------------------
                    total searching time   : 0.787


  012013          6         21         121        148         90        238

                    # of relevant items    :   1
                    # of partially relv    :   1
                    #  of  not relevant    :   2
                    ---------------------------
                    total # evaluated      :   4
                    #  not evaluated       :   3
                    ----------------------------
                    total # retrieved      :   7

                           recall          : 0.074
                          precision        : 0.500

                    total # of search terms:  61
                    total # of commands    :  41
                    total # of cycles      :   6

                    on-line connect time   : 0.723
                    off preparation time   : 0.583
                    ----------------------------
                    total searching time   : 1.306
```

```
                              Searcher No. 040

QUEST-DBASE    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #
  NUMBER         RELV       PREL       NREL       EVAL       NEVL    RETRIEVED

  017005          36         26         88        150        377        527

                 # of relevant items    :   7
                 # of partially relv    :   6
                 #  of  not relevant    :  19
                 ----------------------------
                 total # evaluated      :  32
                 #  not evaluated       :  75
                 -----------------------------
                 total # retrieved      : 107

                       recall           : 0.210
                      precision         : 0.406

                 total # of search terms:   9
                 total # of commands    :  21
                 total # of cycles      :   3

                 on-line connect time   : 0.409
                 off preparation time   : 0.117
                 -----------------------------
                 total searching time   : 0.526


  027013          35         69         46        150         58        208

                 # of relevant items    :  19
                 # of partially relv    :  14
                 #  of  not relevant    :   2
                 ----------------------------
                 total # evaluated      :  35
                 #  not evaluated       :  12
                 -----------------------------
                 total # retrieved      :  47

                       recall           : 0.317
                      precision         : 0.943

                 total # of search terms:  10
                 total # of commands    :  23
                 total # of cycles      :   6

                 on-line connect time   : 0.362
                 off preparation time   : 0.066
                 -----------------------------
                 total searching time   : 0.428
```

```
                        Searcher No. 040

QUEST-DBASE   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #
  NUMBER       RELV      PREL      NREL      EVAL      NEVL    RETRIEVED

  029008        36        34        80       150        77       227

               # of relevant items    :   3
               # of partially relv    :   0
               #  of  not relevant    :   0
               ----------------------------
               total # evaluated      :   3
               #  not evaluated       :   0
               -----------------------------
               total # retrieved      :   3

                     recall           : 0.042
                    precision         : 1.000

               total # of search terms:  22
               total # of commands    :  30
               total # of cycles      :   9

               on-line connect time   : 0.423
               off preparation time   : 0.333
               -----------------------------
               total searching time   : 0.756
```

```
                         Searcher No. 041

QUEST-DBASE    TOTAL #    TOTAL #    TOTAL #    TOTAL #    TOTAL #     TOTAL #
  NUMBER        RELV       PREL       NREL       EVAL       NEVL     RETRIEVED

  023032         29          9         51         89          0          89

                  # of relevant items    :  13
                  # of partially relv    :   0
                  #  of  not relevant    :   8
                  ---------------------------
                  total # evaluated      :  21
                  #  not evaluated       :   0
                  -----------------------------
                  total # retrieved      :  21

                        recall           : 0.342
                      precision          : 0.619

                  total # of search terms:   5
                  total # of commands    :  14
                  total # of cycles      :   4

                  on-line connect time   : 0.189
                  off preparation time   : 0.250
                  -----------------------------
                  total searching time   : 0.439


  037016         78         18         54        150         69         219

                  # of relevant items    :  31
                  # of partially relv    :   6
                  #  of  not relevant    :  10
                  ---------------------------
                  total # evaluated      :  47
                  #  not evaluated       :  26
                  -----------------------------
                  total # retrieved      :  73

                        recall           : 0.385
                      precision          : 0.787

                  total # of search terms:   7
                  total # of commands    :  13
                  total # of cycles      :   4

                  on-line connect time   : 0.198
                  off preparation time   : 0.167
                  -----------------------------
                  total searching time   : 0.365
```

```
                                   Searcher No. 041

QUEST-DBASE     TOTAL #     TOTAL #     TOTAL #     TOTAL #     TOTAL #     TOTAL #
  NUMBER         RELV        PREL        NREL        EVAL        NEVL      RETRIEVED

  038061          79          29          42          150         595         745


                       # of relevant items    :  29
                       # of partially relv    :   8
                       #  of  not relevant    :   3
                       ----------------------------
                       total # evaluated      :  40
                       #  not evaluated       :  64
                       -----------------------------
                       total # retrieved      : 104

                              recall          : 0.343
                            precision         : 0.925

                       total # of search terms:  17
                       total # of commands    :  45
                       total # of cycles      :  14

                       on-line connect time   : 0.857
                       off preparation time   : 0.417
                       -----------------------------
                       total   searching time   : 1.274



  039015          26          38          102         166          0          166


                       # of relevant items    :   1
                       # of partially relv    :   0
                       #  of  not relevant    :   1
                       ----------------------------
                       total # evaluated      :   2
                       #  not evaluated       :   0
                       -----------------------------
                       total # retrieved      :   2

                              recall          : 0.015
                            precision         : 0.500

                       total # of search terms:   7
                       total # of commands    :  19
                       total # of cycles      :   4

                       on-line connect time   : 0.285
                       off preparation time   : 0.417
                       -----------------------------
                       total searching time   : 0.702
```

Searcher No. 041

QUEST-DBASE NUMBER	TOTAL # RELV	TOTAL # PREL	TOTAL # NREL	TOTAL # EVAL	TOTAL # NEVL	TOTAL # RETRIEVED
040016	77	40	32	149	331	480

```
# of relevant items    :  16
# of partially relv    :   9
#  of  not relevant    :   0
-----------------------------
total # evaluated      :  25
#  not evaluated       :  18
------------------------------
total # retrieved      :  43

      recall           : 0.214
     precision         : 1.000

total # of search terms:   3
total # of commands    :  19
total # of cycles      :   7

on-line connect time   : 0.321
off preparation time   : 0.333
------------------------------
total searching time   : 0.654
```

APPENDIX D. ACCESSION NUMBER (I.E., ITEMS RETRIEVED) OVERLAP BETWEEN PAIRS OF SEARCHERS

Appendix D contains one page of data for each of the 40 questions on the number and proportion of accession numbers retrieved in common (i.e., overlap in items retrieved) by all possible pairwise combinations of outside searches of the question. Each data page in Appendix D is organized into three sections which include the following:

1. Seach Evaluation including a definition for each of the headers used on the data sheet, A through J2.

2. Total for Question including the actual values for each search in each items retrieved category:

   A. Number of relevant items retrieved by search ___
   B. Number of partially relevant items retrieved by search ___
   C. Number of not relevant items retrieved by search ___
   D. Number of evaluated items retrieved by search ___
   E. Number of not evaluated items retrieved by search ___
   F. Total number of items retrieved by search ___

3. Search Overlap lists the overlap in accession numbers between a pair of outside searches, designated as S1 and S2. For each pair of outside searches, the number of accession numbers found in common (i.e., overlap) in each category A. through F. is listed. The data are used to calculate the proportions or overlap measures listed in columns G1 to J2 for each pair of searches. Definitions of the proportions calculated are as follow:

$$G1 = \frac{\text{Total number of items retrieved by both searcher 1 and 2}}{\text{Total number retrieved by searcher 1}}$$

$$G2 = \frac{\text{Total number of items retrieved by both searcher 1 and 2}}{\text{Total number retrieved by searcher 2}}$$

$$H1 = \frac{\text{Total number of evaluated items retrieved by both S1 and S2}}{\text{Total number of evaluated items retrieved by S1}}$$

$$H2 = \frac{\text{Total number of evaluated items retrieved by both S1 and S2}}{\text{Total number of evaluated items retrieved by S2}}$$

$$\mathrm{I1} = \frac{\begin{array}{c}\text{Total number of relevant plus partially relevant items}\\ \text{retrieved by both S1 and S2}\end{array}}{\begin{array}{c}\text{Total number of relevant plus partially relevant items}\\ \text{retrieved by S1}\end{array}}$$

$$\mathrm{I2} = \frac{\begin{array}{c}\text{Total number of relevant plus partially relevant items}\\ \text{retrieved by both S1 and S2}\end{array}}{\begin{array}{c}\text{Total number of relevant plus partially relevant items}\\ \text{retrieved by S2}\end{array}}$$

$$\mathrm{J1} = \frac{\text{Total number of not evaluated items retrieved by both S1 and S2}}{\text{Total number of not evaluated items retrieved by S1}}$$

$$\mathrm{J2} = \frac{\text{Total number of not evaluated items retrieved by both S1 and S2}}{\text{Total number of not evaluated items retrieved by S2}}$$

```
                              QUESTION # : 001
                              DATABASE # : 011

          *********************************************************
          *  Accession Number Overlap between pairs of Searchers  *
          *********************************************************

Search Evaluation :
=================
                            ***  Proportions  ***
     A: # Relevant          G1: F in overlap between S1&S2 / F for S1
     B: # Partially Relevant G2: F in overlap between S1&S2 / F for S2
     C: # Not Relevant      H1: D in overlap between S1&S2 / D for S1
     D: Total # Evaluated   H2: D in overlap between S1&S2 / D for S2
     E: # Not Evaluated     I1: A+B in overlap between S1&S2 / A+B for S1
     F: Total # Retrieved   I2: A+B in overlap between S1&S2 / A+B for S2
                            J1: E in overlap between S1&S2 / E for S1
                            J2: E in overlap between S1&S2 / E for S2


Total for Question :
==================

Searcher    A    B    C    D    E    F

     002    3    2    1    6    9   15
     005    7    2    0    9   11   20
     013    5    3    0    8   28   36
     016    1    9   25   35    0   35
     021   11   30   41   82  443  525


Searcher Overlap :
================
Searcher
 S1  S2     A    B    C    D    E    F    G1     G2     H1     H2     I1     I2     J1     J

 002 005    1    0    0    1    1    2 0.133  0.100  0.166  0.111  0.200  0.111  0.111  0.09
 002 013    1    0    0    1    0    1 0.066  0.027  0.166  0.125  0.200  0.125  0.000  0.00
 002 016    0    0    0    0    0    0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.00
 002 021    0    0    0    0    0    0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.00
 005 013    1    0    0    1    5    6 0.300  0.166  0.111  0.125  0.111  0.125  0.454  0.17
 005 016    0    0    0    0    0    0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.00
 005 021    0    0    0    0    0    0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.00
 013 016    0    0    0    0    0    0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.00
 013 021    0    0    0    0    0    0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.00
 016 021    0    3    1    4    0    4 0.114  0.007  0.114  0.048  0.300  0.073  0.000  0.00
```

```
                              QUESTION # : 002
                              DATABASE # : 218

        ***********************************************************
        *  Accession Number Overlap between pairs of Searchers   *
        ***********************************************************

Search Evaluation :
=================
                             ***  Proportions  ***
     A: # Relevant           G1: F in overlap between S1&S2 / F for S1
     B: # Partially Relevant G2: F in overlap between S1&S2 / F for S2
     C: # Not Relevant       H1: D in overlap between S1&S2 / D for S1
     D: Total # Evaluated    H2: D in overlap between S1&S2 / D for S2
     E: # Not Evaluated      I1: A+B in overlap between S1&S2 / A+B for S1
     F: Total # Retrieved    I2: A+B in overlap between S1&S2 / A+B for S2
                             J1: E in overlap between S1&S2 / E for S1
                             J2: E in overlap between S1&S2 / E for S2


Total for Question :
==================

Searcher    A   B   C   D   E   F

     003    5   5  12  22   0  22
     004    0   0   2   2   0   2
     006   14   4   7  25   0  25
     026   16   8  61  85   0  85
     033    1   1  17  19   0  19


Searcher Overlap :
================
Searcher
 S1  S2     A   B   C   D   E   F    G1    G2    H1    H2    I1    I2    J1    J2

 003 004    0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.00
 003 006    3   0   2   5   0   5 0.227 0.200 0.227 0.200 0.300 0.166 0.000 0.00
 003 026    3   1   3   7   0   7 0.318 0.082 0.318 0.082 0.400 0.166 0.000 0.00
 003 033    0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.00
 004 006    0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.00
 004 026    0   0   2   2   0   2 1.000 0.023 1.000 0.023 0.000 0.000 0.000 0.00
 004 033    0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.00
 006 026   10   3   5  18   0  18 0.720 0.211 0.720 0.211 0.722 0.541 0.000 0.00
 006 033    0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.0
 026 033    0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.00
```

```
                              QUESTION # : 003
                              DATABASE # : 064

          *********************************************************
          *  Accession Number Overlap between pairs of Searchers  *
          *********************************************************

Search Evaluation :
=================
                             ***  Proportions  ***
     A: # Relevant           G1: F in overlap between S1&S2 / F for S1
     B: # Partially Relevant G2: F in overlap between S1&S2 / F for S2
     C: # Not Relevant       H1: D in overlap between S1&S2 / D for S1
     D: Total # Evaluated    H2: D in overlap between S1&S2 / D for S2
     E: # Not Evaluated      I1: A+B in overlap between S1&S2 / A+B for S1
     F: Total # Retrieved    I2: A+B in overlap between S1&S2 / A+B for S2
                             J1: E in overlap between S1&S2 / E for S1
                             J2: E in overlap between S1&S2 / E for S2


Total for Question :
==================

Searcher   A   B   C   D   E   F

     002   9  18  26  53  10  63
     014   1   2   1   4  12  16
     016   0   0   0   0 117 117
     021  13  29  34  76  85 161
     033   0   2   0   2   3   5


Searcher Overlap :
================
Searcher
 S1  S2    A   B   C   D   E   F    G1    G2    H1    H2    I1    I2    J1    J2

 002 014   0   1   0   1   0   1 0.015 0.062 0.018 0.250 0.037 0.333 0.000 0.000
 002 016   0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 002 021   1   7   5  13   0  13 0.206 0.080 0.245 0.171 0.296 0.190 0.000 0.000
 002 033   0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 014 016   0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 014 021   0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 014 033   0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 016 021   0   0   0   0   2   2 0.017 0.012 0.000 0.000 0.000 0.000 0.017 0.023
 016 033   0   0   0   0   1   1 0.008 0.200 0.000 0.000 0.000 0.000 0.008 0.333
 021 033   0   2   0   2   3   5 0.031 1.000 0.026 1.000 0.047 1.000 0.035 1.000
```

```
                         QUESTION # : 004
                         DATABASE # : 154

          ********************************************************
          *  Accession Number Overlap between pairs of Searchers  *
          ********************************************************

Search Evaluation :
=================
                             ***  Proportions  ***
     A: # Relevant           G1: F in overlap between S1&S2 / F for S1
     B: # Partially Relevant G2: F in overlap between S1&S2 / F for S2
     C: # Not Relevant       H1: D in overlap between S1&S2 / D for S1
     D: Total # Evaluated    H2: D in overlap between S1&S2 / D for S2
     E: # Not Evaluated      I1: A+B in overlap between S1&S2 / A+B for S1
     F: Total # Retrieved    I2: A+B in overlap between S1&S2 / A+B for S2
                             J1: E in overlap between S1&S2 / E for S1
                             J2: E in overlap between S1&S2 / E for S2


Total for Question :
==================

Searcher    A   B   C   D   E   F

     009    6   1   3  10   1  11
     010   11  14   7  32   1  33
     024   28   8   5  41   1  42
     028    5   0   4   9   1  10
     037   12  12  10  34   2  36


Searcher Overlap :
================
Searcher
 S1  S2     A   B   C   D   E   F    G1    G2    H1    H2    I1    I2    J1    J2

 009 010    0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 009 024    3   0   2   5   0   5 0.454 0.119 0.500 0.121 0.428 0.083 0.000 0.000
 009 028    3   0   2   5   0   5 0.454 0.500 0.500 0.555 0.428 0.600 0.000 0.000
 009 037    0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 010 024    0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 010 028    0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 010 037    2   1   0   3   0   3 0.090 0.083 0.093 0.088 0.120 0.125 0.000 0.000
 024 028    4   0   3   7   0   7 0.166 0.700 0.170 0.777 0.111 0.800 0.000 0.000
 024 037    1   0   0   1   0   1 0.023 0.027 0.024 0.029 0.027 0.041 0.000 0.000
 028 037    1   0   0   1   0   1 0.100 0.027 0.111 0.029 0.200 0.041 0.000 0.000
```

```
                              QUESTION # : 005
                              DATABASE # : 148

           ********************************************************
           *  Accession Number Overlap between pairs of Searchers  *
           ********************************************************

Search Evaluation :
=================
                             ***  Proportions  ***
     A: # Relevant           G1: F in overlap between S1&S2 / F for S1
     B: # Partially Relevant G2: F in overlap between S1&S2 / F for S2
     C: # Not Relevant       H1: D in overlap between S1&S2 / D for S1
     D: Total # Evaluated    H2: D in overlap between S1&S2 / D for S2
     E: # Not Evaluated      I1: A+B in overlap between S1&S2 / A+B for S1
     F: Total # Retrieved    I2: A+B in overlap between S1&S2 / A+B for S2
                             J1: E in overlap between S1&S2 / E for S1
                             J2: E in overlap between S1&S2 / E for S2


Total for Question :
==================

Searcher    A   B   C   D   E   F

     003    6  15  10  31   2  33
     004    1   2   4   7   0   7
     006    0   3   5   8   2  10
     013    0   0   0   0   5   5
     026    1   0   3   4   0   4


Searcher Overlap :
================
Searcher
 S1  S2     A   B   C   D   E   F    G1     G2     H1     H2     I1     I2     J1     J2

 003 004    1   2   4   7   0   7 0.212  1.000  0.225  1.000  0.142  1.000  0.000  0.000
 003 006    0   3   4   7   1   8 0.242  0.800  0.225  0.875  0.142  1.000  0.500  0.500
 003 013    0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 003 026    0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 004 006    0   0   2   2   0   2 0.285  0.200  0.285  0.250  0.000  0.000  0.000  0.000
 004 013    0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 004 026    0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 006 013    0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 006 026    0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 013 026    0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
```

```
                         QUESTION # : 006
                         DATABASE # : 006

          *********************************************************
          *  Accession Number Overlap between pairs of Searchers  *
          *********************************************************

Search Evaluation :
=================
                                  ***  Proportions  ***
     A: # Relevant                G1: F in overlap between S1&S2 / F for S1
     B: # Partially Relevant      G2: F in overlap between S1&S2 / F for S2
     C: # Not Relevant            H1: D in overlap between S1&S2 / D for S1
     D: Total # Evaluated         H2: D in overlap between S1&S2 / D for S2
     E: # Not Evaluated           I1: A+B in overlap between S1&S2 / A+B for S1
     F: Total # Retrieved         I2: A+B in overlap between S1&S2 / A+B for S2
                                  J1: E in overlap between S1&S2 / E for S1
                                  J2: E in overlap between S1&S2 / E for S2


Total for Question :
==================

Searcher   A   B   C   D   E   F

     011   0   0   0   0   1   1
     027   0   1  67  68  47 115
     038   0   0   2   2   1   3
     039   2   4  39  45  20  65
     040   0   0   4   4   0   4


Searcher Overlap :
================
Searcher
 S1  S2    A   B   C   D   E   F    G1     G2     H1     H2     I1     I2     J1     J2

 011 027   0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 011 038   0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 011 039   0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 011 040   0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 027 038   0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 027 039   0   0   0   0   1   1 0.008  0.015  0.000  0.000  0.000  0.000  0.021  0.050
 027 040   0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 038 039   0   0   0   0   1   1 0.333  0.015  0.000  0.000  0.000  0.000  1.000  0.050
 038 040   0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 039 040   0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
```

```
                            QUESTION # : 007
                            DATABASE # : 075

              **********************************************************
              *  Accession Number Overlap between pairs of Searchers  *
              **********************************************************

Search Evaluation :
=================
                           ***  Proportions  ***
     A: # Relevant         G1: F in overlap between S1&S2 / F for S1
     B: # Partially Relevant G2: F in overlap between S1&S2 / F for S2
     C: # Not Relevant     H1: D in overlap between S1&S2 / D for S1
     D: Total # Evaluated  H2: D in overlap between S1&S2 / D for S2
     E: # Not Evaluated    I1: A+B in overlap between S1&S2 / A+B for S1
     F: Total # Retrieved  I2: A+B in overlap between S1&S2 / A+B for S2
                           J1: E in overlap between S1&S2 / E for S1
                           J2: E in overlap between S1&S2 / E for S2


Total for Question :
==================

Searcher    A    B    C    D    E    F

     003    1    3    1    5    0    5
     004   16   23   28   67  278  345
     006    0    0    0    0    1    1
     014    1    0    1    2   10   12
     026    3    1    1    5   13   18


Searcher Overlap :
================
Searcher
 S1  S2     A    B    C    D    E    F     G1     G2     H1     H2     I1     I2     J1     J2

 003 004    0    0    0    0    0    0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 003 006    0    0    0    0    0    0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 003 014    0    0    0    0    0    0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 003 026    0    0    0    0    0    0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 004 006    0    0    0    0    0    0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 004 014    0    0    0    0    2    2 0.005  0.166  0.000  0.000  0.000  0.000  0.007  0.200
 004 026    0    0    1    1    1    2 0.005  0.111  0.014  0.200  0.000  0.000  0.003  0.076
 006 014    0    0    0    0    0    0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 006 026    0    0    0    0    0    0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 014 026    0    0    0    0    0    0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
```

```
                         QUESTION # : 008
                         DATABASE # : 154

      **********************************************************
      *  Accession Number Overlap between pairs of Searchers   *
      ************************************************************

Search Evaluation :
=================
                             ***  Proportions  ***
     A: # Relevant           G1: F in overlap between S1&S2 / F for S1
     B: # Partially Relevant G2: F in overlap between S1&S2 / F for S2
     C: # Not Relevant       H1: D in overlap between S1&S2 / D for S1
       D: Total # Evaluated    H2: D in overlap between S1&S2 / D for S2
     E: # Not Evaluated      I1: A+B in overlap between S1&S2 / A+B for S1
     F: Total # Retrieved    I2: A+B in overlap between S1&S2 / A+B for S2
                             J1: E in overlap between S1&S2 / E for S1
                             J2: E in overlap between S1&S2 / E for S2


Total for Question :
==================

Searcher    A    B    C    D    E    F

     009    0    0    8    8    0    8
     010    2    3   51   56    0   56
     024    2    3   34   39    0   39
     028    0    0    3    3    0    3
     037    2    0   11   13    0   13


Searcher Overlap :
================
Searcher
 S1  S2     A    B    C    D    E    F     G1     G2     H1     H2     I1     I2     J1     J2

 009 010    0    0    8    8    0    8  1.000  0.142  1.000  0.142  0.000  0.000  0.000  0.000
 009 024    0    0    8    8    0    8  1.000  0.205  1.000  0.205  0.000  0.000  0.000  0.000
 009 028    0    0    0    0    0    0  0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 009 037    0    0    1    1    0    1  0.125  0.076  0.125  0.076  0.000  0.000  0.000  0.000
 010 024    2    3   34   39    0   39  0.696  1.000  0.696  1.000  1.000  1.000  0.000  0.000
 010 028    0    0    2    2    0    2  0.035  0.666  0.035  0.666  0.000  0.000  0.000  0.000
 010 037    2    0   11   13    0   13  0.232  1.000  0.232  1.000  0.400  1.000  0.000  0.000
 024 028    0    0    0    0    0    0  0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 024 037    2    0    1    3    0    3  0.076  0.230  0.076  0.230  0.400  1.000  0.000  0.000
 028 037    0    0    2    2    0    2  0.666  0.153  0.666  0.153  0.000  0.000  0.000  0.000
```

```
                         QUESTION # : 009
                         DATABASE # : 037

         ********************************************************
         *  Accession Number Overlap between pairs of Searchers  *
         ********************************************************

Search Evaluation :
=================
                             ***  Proportions  ***
     A: # Relevant           G1: F in overlap between S1&S2 / F for S1
     B: # Partially Relevant G2: F in overlap between S1&S2 / F for S2
     C: # Not Relevant       H1: D in overlap between S1&S2 / D for S1
     D: Total # Evaluated    H2: D in overlap between S1&S2 / D for S2
     E: # Not Evaluated      I1: A+B in overlap between S1&S2 / A+B for S1
     F: Total # Retrieved    I2: A+B in overlap between S1&S2 / A+B for S2
                             J1: E in overlap between S1&S2 / E for S1
                             J2: E in overlap between S1&S2 / E for S2


Total for Question :
==================

Searcher   A   B   C   D   E   F

     002   1   6   2   9  45  54
     014   2   6  29  37  97 134
     016   0   3  27  30  54  84
     021   1   3   2   6  52  58
     033   1   5   0   6  26  32


Searcher Overlap :
================
Searcher
 S1  S2    A   B   C   D   E   F    G1    G2    H1    H2    I1    I2    J1    J2

 002 014   0   1   0   1   0   1 0.018 0.007 0.111 0.027 0.142 0.125 0.000 0.00
 002 016   0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.00
 002 021   0   1   0   1   5   6 0.111 0.103 0.111 0.166 0.142 0.250 0.111 0.09
 002 033   0   1   0   1   3   4 0.074 0.125 0.111 0.166 0.142 0.166 0.066 0.11
 014 016   0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.00
 014 021   0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.00
 014 033   0   0   0   0   1   1 0.007 0.031 0.000 0.000 0.000 0.000 0.010 0.03
 016 021   0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.00
 016 033   0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.00
 021 033   0   0   0   0   2   2 0.034 0.062 0.000 0.000 0.000 0.000 0.038 0.07
```

```
                              QUESTION # : 010
                              DATABASE # : 154

          **********************************************************
          *  Accession Number Overlap between pairs of Searchers  *
          **********************************************************

Search Evaluation :
=================
                             ***  Proportions  ***
     A: # Relevant           G1: F in overlap between S1&S2 / F for S1
     B: # Partially Relevant G2: F in overlap between S1&S2 / F for S2
     C: # Not Relevant       H1: D in overlap between S1&S2 / D for S1
     D: Total # Evaluated    H2: D in overlap between S1&S2 / D for S2
     E: # Not Evaluated      I1: A+B in overlap between S1&S2 / A+B for S1
     F: Total # Retrieved    I2: A+B in overlap between S1&S2 / A+B for S2
                             J1: E in overlap between S1&S2 / E for S1
                             J2: E in overlap between S1&S2 / E for S2


Total for Question :
==================

Searcher    A   B   C   D   E   F

     009    1   0   0   1   3   4
     010    0   0  28  28  72 100
     024    2   0   3   5  14  19
     028    0   0   4   4  18  22
     037    2   1   2   5  13  18


Searcher Overlap :
================
Searcher
 S1  S2     A   B   C   D   E   F    G1     G2     H1     H2     I1     I2     J1     J2

 009 010    0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 009 024    1   0   0   1   2   3 0.750  0.157  1.000  0.200  1.000  0.500  0.666  0.142
 009 028    0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 009 037    1   0   0   1   1   2 0.500  0.111  1.000  0.200  1.000  0.333  0.333  0.076
 010 024    0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 010 028    0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 010 037    0   0   0   0   1   1 0.010  0.055  0.000  0.000  0.000  0.000  0.013  0.076
 024 028    0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 024 037    2   0   1   3   6   9 0.473  0.500  0.600  0.600  1.000  0.666  0.428  0.461
 028 037    0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
```

```
                                   QUESTION # : 011
                                   DATABASE # : 154

               *********************************************************
               *  Accession Number Overlap between pairs of Searchers  *
               *********************************************************

Search Evaluation :
=================
                             ***  Proportions  ***
     A: # Relevant           G1: F in overlap between S1&S2 / F for S1
     B: # Partially Relevant G2: F in overlap between S1&S2 / F for S2
     C: # Not Relevant       H1: D in overlap between S1&S2 / D for S1
     D: Total # Evaluated    H2: D in overlap between S1&S2 / D for S2
     E: # Not Evaluated      I1: A+B in overlap between S1&S2 / A+B for S1
     F: Total # Retrieved    I2: A+B in overlap between S1&S2 / A+B for S2
                             J1: E in overlap between S1&S2 / E for S1
                             J2: E in overlap between S1&S2 / E for S2


Total for Question :
==================

Searcher    A    B    C    D    E    F

     009    1    0    1    2    7    9
     010    3    6   31   40   58   98
     024    2    6   15   23   22   45
     028    2    6   19   27   27   54
     037    0    1    1    2    3    5


Searcher Overlap :
================
Searcher
 S1  S2     A    B    C    D    E    F    G1     G2     H1     H2     I1     I2     J1     J2

 009 010    0    0    1    1    7    8 0.888  0.081  0.500  0.025  0.000  0.000  1.000  0.120
 009 024    0    0    0    0    2    2 0.222  0.044  0.000  0.000  0.000  0.000  0.285  0.090
 009 028    0    0    0    0    2    2 0.222  0.037  0.000  0.000  0.000  0.000  0.285  0.074
 009 037    0    0    1    1    3    4 0.444  0.800  0.500  0.500  0.000  0.000  0.428  1.000
 010 024    2    5   11   18   20   38 0.387  0.844  0.450  0.782  0.777  0.875  0.344  0.909
 010 028    2    5   14   21   25   46 0.469  0.851  0.525  0.777  0.777  0.875  0.431  0.925
 010 037    0    0    1    1    3    4 0.040  0.800  0.025  0.500  0.000  0.000  0.051  1.000
 024 028    2    6   15   23   22   45 1.000  0.833  1.000  0.851  1.000  1.000  1.000  0.814
 024 037    0    0    0    0    0    0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 028 037    0    0    0    0    0    0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
```

```
                              QUESTION # : 012
                              DATABASE # : 013

        ********************************************************
        *  Accession Number Overlap between pairs of Searchers  *
        ********************************************************

Search Evaluation :
=================
                             ***  Proportions  ***
     A: # Relevant           G1: F in overlap between S1&S2 / F for S1
     B: # Partially Relevant G2: F in overlap between S1&S2 / F for S2
     C: # Not Relevant       H1: D in overlap between S1&S2 / D for S1
     D: Total # Evaluated    H2: D in overlap between S1&S2 / D for S2
     E: # Not Evaluated      I1: A+B in overlap between S1&S2 / A+B for S1
     F: Total # Retrieved    I2: A+B in overlap between S1&S2 / A+B for S2
                             J1: E in overlap between S1&S2 / E for S1
                             J2: E in overlap between S1&S2 / E for S2


Total for Question :
==================

Searcher    A   B   C   D   E   F

     005    0   3  30  33  17  50
     011    4   9  31  44  38  82
     027    1   4   7  12   7  19
     029    0   4   5   9   4  13
     040    1   1   2   4   3   7


Searcher Overlap :
================
Searcher
 S1  S2     A   B   C   D   E   F    G1    G2    H1    H2    I1    I2    J1    J2

 005 011    0   0   2   2   4   6 0.120 0.073 0.060 0.045 0.000 0.000 0.235 0.105
 005 027    0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 005 029    0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 005 040    0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 011 027    0   4   3   7   4  11 0.134 0.578 0.159 0.583 0.307 0.800 0.105 0.571
 011 029    0   4   2   6   3   9 0.109 0.692 0.136 0.666 0.307 1.000 0.078 0.750
 011 040    1   1   1   3   0   3 0.036 0.428 0.068 0.750 0.153 1.000 0.000 0.000
 027 029    0   4   5   9   4  13 0.684 1.000 0.750 1.000 0.800 1.000 0.571 1.000
 027 040    0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 029 040    0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
```

```
                          QUESTION # : 013
                          DATABASE # : 015

          **********************************************************
          *  Accession Number Overlap between pairs of Searchers  *
          **********************************************************

Search Evaluation :
=================
                               ***  Proportions  ***
     A: # Relevant             G1: F in overlap between S1&S2 / F for S1
     B: # Partially Relevant   G2: F in overlap between S1&S2 / F for S2
     C: # Not Relevant         H1: D in overlap between S1&S2 / D for S1
     D: Total # Evaluated      H2: D in overlap between S1&S2 / D for S2
     E: # Not Evaluated        I1: A+B in overlap between S1&S2 / A+B for S1
     F: Total # Retrieved      I2: A+B in overlap between S1&S2 / A+B for S2
                               J1: E in overlap between S1&S2 / E for S1
                               J2: E in overlap between S1&S2 / E for S2


Total for Question :
==================

Searcher    A    B    C    D    E    F

     003    3    5   22   30    3   33
     004    1    1    0    2    0    2
     006    2    8   19   29    1   30
     013    3   18   39   60    5   65
     026    4   14   37   55    7   62


Searcher Overlap :
================
Searcher
 S1  S2     A    B    C    D    E    F    G1    G2    H1    H2    I1    I2    J1    J2

 003 004    1    0    0    1    0    1 0.030 0.500 0.033 0.500 0.125 0.500 0.000 0.000
 003 006    2    1    3    6    0    6 0.181 0.200 0.200 0.206 0.375 0.300 0.000 0.000
 003 013    2    1    2    5    0    5 0.151 0.076 0.166 0.083 0.375 0.142 0.000 0.000
 003 026    2    2    3    7    0    7 0.212 0.112 0.233 0.127 0.500 0.222 0.000 0.000
 004 006    1    0    0    1    0    1 0.500 0.033 0.500 0.034 0.500 0.100 0.000 0.000
 004 013    1    1    0    2    0    2 1.000 0.030 1.000 0.033 1.000 0.095 0.000 0.000
 004 026    1    1    0    2    0    2 1.000 0.032 1.000 0.036 1.000 0.111 0.000 0.000
 006 013    1    3    2    6    0    6 0.200 0.092 0.206 0.100 0.400 0.190 0.000 0.000
 006 026    1    4    8   13    1   14 0.466 0.225 0.448 0.236 0.500 0.277 1.000 0.142
 013 026    3    7    7   17    2   19 0.292 0.306 0.283 0.309 0.476 0.555 0.400 0.285
```

```
                              QUESTION # : 014
                              DATABASE # : 151

          *********************************************************
          *  Accession Number Overlap between pairs of Searchers  *
          *********************************************************

Search Evaluation :
=================
                             ***  Proportions  ***
     A: # Relevant           G1: F in overlap between S1&S2 / F for S1
     B: # Partially Relevant G2: F in overlap between S1&S2 / F for S2
     C: # Not Relevant       H1: D in overlap between S1&S2 / D for S1
     D: Total # Evaluated    H2: D in overlap between S1&S2 / D for S2
     E: # Not Evaluated      I1: A+B in overlap between S1&S2 / A+B for S1
     F: Total # Retrieved    I2: A+B in overlap between S1&S2 / A+B for S2
                             J1: E in overlap between S1&S2 / E for S1
                             J2: E in overlap between S1&S2 / E for S2


Total for Question :
==================

Searcher    A   B   C   D   E   F

     003   16  26   9  51   1  52
     004   10  15   5  30   1  31
     006   11  19   7  37   2  39
     026    0   1  32  33   0  33
     033   24  50  14  88   1  89


Searcher Overlap :
================
Searcher
 S1  S2     A   B   C   D   E   F    G1    G2    H1    H2    I1    I2    J1    J2

 003 004   10  15   4  29   1  30 0.576 0.967 0.568 0.966 0.595 1.000 1.000 1.000
 003 006   10  15   4  29   1  30 0.576 0.769 0.568 0.783 0.595 0.833 1.000 0.500
 003 026    0   0   1   1   0   1 0.019 0.030 0.019 0.030 0.000 0.000 0.000 0.000
 003 033    7  13   3  23   1  24 0.461 0.269 0.450 0.261 0.476 0.270 1.000 1.000
 004 006   10  15   5  30   1  31 1.000 0.794 1.000 0.810 1.000 0.833 1.000 0.500
 004 026    0   0   2   2   0   2 0.064 0.060 0.066 0.060 0.000 0.000 0.000 0.000
 004 033    5  11   4  20   1  21 0.677 0.235 0.666 0.227 0.640 0.216 1.000 1.000
 006 026    0   0   2   2   0   2 0.051 0.060 0.054 0.060 0.000 0.000 0.000 0.000
 006 033    5  13   5  23   1  24 0.615 0.269 0.621 0.261 0.600 0.243 0.500 1.000
 026 033    0   0   1   1   0   1 0.030 0.011 0.030 0.011 0.000 0.000 0.000 0.000
```

```
                              QUESTION # : 015
                              DATABASE # : 154

          **********************************************************
          *  Accession Number Overlap between pairs of Searchers  *
          **********************************************************

Search Evaluation :
=================
                             ***  Proportions  ***
     A: # Relevant           G1: F in overlap between S1&S2 / F for S1
     B: # Partially Relevant G2: F in overlap between S1&S2 / F for S2
     C: # Not Relevant       H1: D in overlap between S1&S2 / D for S1
     D: Total # Evaluated    H2: D in overlap between S1&S2 / D for S2
     E: # Not Evaluated      I1: A+B in overlap between S1&S2 / A+B for S1
     F: Total # Retriiieved     I2: A+B in overlap between S1&S2 / A+B for S2
                             J1: E in overlap between S1&S2 / E for S1
                             J2: E in overlap between S1&S2 / E for S2


Total for Question :
==================

Searcher   A   B   C   D   E   F

     009   9  12   3  24  36  60
     010  27  61  30 118 144 262
     024  14  25   5  44  63 107
     028  22  41  12  75 105 180
     037  13  21   9  43  52  95


Searcher Overlap :
=================
Searcher
 S1  S2    A   B   C   D   E   F    G1    G2    H1    H2    I1    I2    J1    J2

 009 010   9  12   3  24  36  60 1.000 0.229 1.000 0.203 1.000 0.238 1.000 0.250
 009 024   1   4   0   5  17  22 0.366 0.205 0.208 0.113 0.238 0.128 0.472 0.269
 009 028   9  11   3  23  36  59 0.983 0.327 0.958 0.306 0.952 0.317 1.000 0.342
 009 037   9   9   3  21  26  47 0.783 0.494 0.875 0.488 0.857 0.529 0.722 0.500
 010 024  14  25   5  44  63 107 0.408 1.000 0.372 1.000 0.443 1.000 0.437 1.000
 010 028  22  41  12  75 105 180 0.687 1.000 0.635 1.000 0.715 1.000 0.729 1.000
 010 037  13  21   9  43  52  95 0.362 1.000 0.364 1.000 0.386 1.000 0.361 1.000
 024 028  12  24   4  40  62 102 0.953 0.566 0.909 0.533 0.923 0.571 0.984 0.590
 024 037   3  13   2  18  33  51 0.476 0.536 0.409 0.418 0.410 0.470 0.523 0.634
 028 037  13  21   9  43  52  95 0.527 1.000 0.573 1.000 0.539 1.000 0.495 1.000
```

```
                              QUESTION # : 016
                              DATABASE # : 011

           ****************************************************
           *  Accession Number Overlap between pairs of Searchers  *
           ****************************************************

Search Evaluation :
=================
                             ***  Proportions  ***
     A: # Relevant           G1: F in overlap between S1&S2 / F for S1
     B: # Partially Relevant G2: F in overlap between S1&S2 / F for S2
     C: # Not Relevant       H1: D in overlap between S1&S2 / D for S1
     D: Total # Evaluated    H2: D in overlap between S1&S2 / D for S2
     E: # Not Evaluated      I1: A+B in overlap between S1&S2 / A+B for S1
     F: Total # Retrieved    I2: A+B in overlap between S1&S2 / A+B for S2
                             J1: E in overlap between S1&S2 / E for S1
                             J2: E in overlap between S1&S2 / E for S2


Total for Question :
==================

Searcher    A   B   C   D   E   F

     002   20  21  30  71   0  71
     005    2   3   3   8   0   8
     013    4   4  37  45   0  45
     016   15  17  27  59   0  59
     021    3   4  20  27   0  27


Searcher Overlap :
================
Searcher
 S1  S2     A   B   C   D   E   F    G1    G2    H1    H2    I1    I2    J1    J2

 002 005    1   0   0   1   0   1 0.014 0.125 0.014 0.125 0.024 0.200 0.000 0.000
 002 013    3   3   8  14   0  14 0.197 0.311 0.197 0.311 0.146 0.750 0.000 0.000
 002 016   13  13  15  41   0  41 0.577 0.694 0.577 0.694 0.634 0.812 0.000 0.000
 002 021    3   3   0   6   0   6 0.084 0.222 0.084 0.222 0.146 0.857 0.000 0.000
 005 013    0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 005 016    1   0   0   1   0   1 0.125 0.016 0.125 0.016 0.200 0.031 0.000 0.000
 005 021    0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 013 016    3   1   4   8   0   8 0.177 0.135 0.177 0.135 0.500 0.125 0.000 0.000
 013 021    0   1   2   3   0   3 0.066 0.111 0.066 0.111 0.125 0.142 0.000 0.000
 016 021    1   3   0   4   0   4 0.067 0.148 0.067 0.148 0.125 0.571 0.000 0.000
```

```
                              QUESTION # : 017
                              DATABASE # : 005

          ****************************************************
          *  Accession Number Overlap between pairs of Searchers  *
          ****************************************************

Search Evaluation :
=================
                                   ***  Proportions  ***
     A: # Relevant                 G1::: F in overlap between S1&S2 / F for S1
     B: # Partially Relevant  G2: F in overlap between S1&S2 / F for S2
     C: # Not Relevant             H1: D in overlap between S1&S2 / D for S1
     D: Total # Evaluated          H2: D in overlap between S1&S2 / D for S2
     E: # Not Evaluated            I1: A+B in overlap between S1&S2 / A+B for S1
     F: Total # Retrieved          I2: A+B in overlap between S1&S2 / A+B for S2
                                   J1: E in overlap between S1&S2 / E for S1
                                   J2: E in overlap between S1&S2 / E for S2


Total for Question :
==================

Searcher    A    B    C    D    E    F

     011    6    9   38   53   64  117
     027    4    2   18   24  135  159
     038    0    1    0    1    0    1
     039   22    9    8   39   94  133
     040    7    6   19   32   75  107


Searcher Overlap :
================
Searcher
 S1  S2     A    B    C    D    E    F    G1    G2    H1    H2    I1    I2    J1    J2

 011 027    2    0    0    2    5    7 0.059 0.044 0.037 0.083 0.133 0.333 0.078 0.037
 011 038    0    0    0    0    0    0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 011 039    1    1    0    2    6    8 0.068 0.060 0.037 0.051 0.133 0.064 0.093 0.063
 011 040    1    0    0    1    2    3 0.025 0.028 0.018 0.031 0.066 0.076 0.031 0.026
 027 038    0    0    0    0    0    0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 027 039    2    0    0    2   10   12 0.075 0.090 0.083 0.051 0.333 0.064 0.074 0.106
 027 040    1    0    0    1    4    5 0.031 0.046 0.041 0.031 0.166 0.076 0.029 0.053
 038 039    0    0    0    0    0    0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 038 040    0    1    0    1    0    1 1.000 0.009 1.000 0.031 1.000 0.076 0.000 0.000
 039 040    4    0    2    6   13   19 0.142 0.177 0.153 0.187 0.129 0.307 0.138 0.173
```

```
                              QUESTION # : 018
                              DATABASE # : 015

               ********************************************************
               *  Accession Number Overlap between pairs of Searchers  *
               ********************************************************

Search Evaluation :
=================
                              ***  Proportions  ***
     A: # Relevant            G1: F in overlap between S1&S2 / F for S1
     B: # Partially Relevant  G2: F in overlap between S1&S2 / F for S2
     C: # Not Relevant        H1: D in overlap between S1&S2 / D for S1
     D: Total # Evaluated     H2: D in overlap between S1&S2 / D for S2
     E: # Not Evaluated       I1: A+B in overlap between S1&S2 / A+B for S1
     F: Total # Retrieved     I2: A+B in overlap between S1&S2 / A+B for S2
                              J1: E in overlap between S1&S2 / E for S1
                              J2: E in overlap between S1&S2 / E for S2


Total for Question :
==================

Searcher    A   B   C   D   E   F

     003    0   0   0   0   1   1
     004   55  29  31 115 541 656
     006   18  11  10  39  30  69
     014    0   0   0   0   1   1
     026    0   0   0   0   1   1


Searcher Overlap :
================
Searcher
 S1  S2     A   B   C   D   E   F    G1     G2     H1     H2     I1     I2     J1     J

 003 004    0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.00
 003 006    0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.00
 003 014    0   0   0   0   1   1 1.000  1.000  0.000  0.000  0.000  0.000  1.000  1.00
 003 026    0   0   0   0   1   1 1.000  1.000  0.000  0.000  0.000  0.000  1.000  1.00
 004 006   13   6   4  23  15  38 0.057  0.550  0.200  0.589  0.226  0.655  0.027  0.50
 004 014    0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.00
 004 026    0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.00
 006 014    0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.00
 006 026    0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.00
 014 026    0   0   0   0   1   1 1.000  1.000  0.000  0.000  0.000  0.000  1.000  1.00
```

```
                                QUESTION # : 019
                                DATABASE # : 075

                ********************************************************
                *  Accession Number Overlap between pairs of Searchers  *
                ********************************************************

Search Evaluation :
=================
                                    ***  Proportions  ***
     A: # Relevant                  G1: F in overlap between S1&S2 / F for S1
     B: # Partially Relevant        G2: F in overlap between S1&S2 / F for S2
     C: # Not Relevant              H1: D in overlap between S1&S2 / D for S1
     D: Total # Evaluated           H2: D in overlap between S1&S2 / D for S2
     E: # Not Evaluated             I1: A+B in overlap between S1&S2 / A+B for S1
     F: Total # Retrieved           I2: A+B in overlap between S1&S2 / A+B for S2
                                    J1: E in overlap between S1&S2 / E for S1
                                    J2: E in overlap between S1&S2 / E for S2


Total for Question :
==================

Searcher    A   B   C   D   E   F

     001    0   0   1   1   1   2
     005    4   5   3  12   1  13
     008    6  15  15  36   4  40
     013    6  12   2  20   5  25
     017    7  14  22  43  18  61


Searcher Overlap :
================
Searcher
 S1  S2     A   B   C   D   E   F    G1    G2    H1    H2    I1    I2    J1    J2

 001 005    0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 001 008    0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 001 013    0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 001 017    0   0   1   1   1   2 1.000 0.032 1.000 0.023 0.000 0.000 1.000 0.055
 005 008    2   2   0   4   0   4 0.307 0.100 0.333 0.111 0.444 0.190 0.000 0.000
 005 013    2   3   1   6   0   6 0.461 0.240 0.500 0.300 0.555 0.277 0.000 0.000
 005 017    1   0   0   1   0   1 0.076 0.016 0.083 0.023 0.111 0.047 0.000 0.000
 008 013    4   4   0   8   1   9 0.225 0.360 0.222 0.400 0.380 0.444 0.250 0.200
 008 017    2   5   1   8   1   9 0.225 0.147 0.222 0.186 0.333 0.333 0.250 0.055
 013 017    2   0   0   2   0   2 0.080 0.032 0.100 0.046 0.111 0.095 0.000 0.000
```

```
                              QUESTION # : 020
                              DATABASE # : 015

          **********************************************************
          *  Accession Number Overlap between pairs of Searchers  *
          **********************************************************

Search Evaluation :
=================
                             ***  Proportions  ***
     A: # Relevant           G1: F in overlap between S1&S2 / F for S1
     B: # Partially Relevant G2: F in overlap between S1&S2 / F for S2
     C: # Not Relevant       H1: D in overlap between S1&S2 / D for S1
     D: Total # Evaluated    H2: D in overlap between S1&S2 / D for S2
     E: # Not Evaluated      I1: A+B in overlap between S1&S2 / A+B for S1
     F: Total # Retrieved    I2: A+B in overlap between S1&S2 / A+B for S2
                             J1: E in overlap between S1&S2 / E for S1
                             J2: E in overlap between S1&S2 / E for S2


Total for Question :
==================

Searchher   A   B   C   D   E   F

     001   0   1   1   2   2   4
     005   1   0   3   4   5   9
     013   5  11  33  49  43  92
     017   0   4  10  14  25  39
     032   2   2   6  10   8  18


Searcher Overlap :
=================
Searcher
 S1  S2    A   B   C   D   E   F    G1    G2    H1    H2    I1    I2    J1    J2

 001 005   0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 001 013   0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 001 017   0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 001 032   0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 005 013   0   0   0   0   1   1 0.111 0.010 0.000 0.000 0.000 0.000 0.200 0.023
 005 017   0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 005 032   0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 013 017   0   2   3   5   3   8 0.086 0.205 0.102 0.357 0.125 0.500 0.069 0.120
 013 032   2   2   3   7   3  10 0.108 0.555 0.142 0.700 0.250 1.000 0.069 0.375
 017 032   0   1   2   3   2   5 0.128 0.277 0.214 0.300 0.250 0.250 0.080 0.250
```

```
                              QUESTION # : 021
                              DATABASE # : 037

          *********************************************************
          *  Accession Number Overlap between pairs of Searchers  *
          *********************************************************

Search Evaluation :
=================
                            ***  Proportions  ***
     A: # Relevant          G1: F in overlap between S1&S2 / F for S1
     B: # Partially Relevant G2: F in overlap between S1&S2 / F for S2
     C: # Not Relevant      H1: D in overlap between S1&S2 / D for S1
     D: Total # Evaluated   H2: D in overlap between S1&S2 / D for S2
     E: # Not Evaluated     I1: A+B in overlap between S1&S2 / A+B for S1
     F: Total # Retrieved   I2: A+B in overlap between S1&S2 / A+B for S2
                            J1: E in overlap between S1&S2 / E for S1
                            J2: E in overlap between S1&S2 / E for S2


Total for Question :
==================

Searcher    A   B   C   D   E   F

     002    6   0   9  15   0  15
     014    1   0   0   1   0   1
     016    0   2  28  30   0  30
     021    0   1   5   6   0   6
     033   11   3  31  45   0  45


Searcher Overlap :
================
Searcher
 S1  S2     A   B   C   D   E   F    G1     G2     H1     H2     I1     I2     J1     J2

 002 014    0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 002 016    0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 002 021    0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 002 033    2   0   0   2   0   2 0.133  0.044  0.133  0.044  0.333  0.142  0.000  0.000
 014 016    0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 014 021    0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 014 033    0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 016 021    0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 016 033    0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 021 033    0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
```

```
                        QUESTION # : 022
                        DATABASE # : 108

           ************************************************************
           *  Accession Number Overlap between pairs of Searchers  *
           ************************************************************

Search Evaluation :
=================
                           ***  Proportions  ***
     A: # Relevant         G1: F in overlap between S1&S2 / F for S1
     B: # Partially Relevant G2: F in overlap between S1&S2 / F for S2
     C: # Not Relevant     H1: D in overlap between S1&S2 / D for S1
     D: Total # Evaluated  H2: D in overlap between S1&S2 / D for S2
     E: # Not Evaluated    I1: A+B in overlap between S1&S2 / A+B for S1
     F: Total # Retrieved  I2: A+B in overlap between S1&S2 / A+B for S2
                           J1: E in overlap between S1&S2 / E for S1
                           J2: E in overlap between S1&S2 / E for S2


Total for Question :
==================

Searcher    A    B    C    D    E    F

     008    2   18    0   20   83  103
     027    6   60    0   66   68  134
     032    1    5    0    6    8   14
     038    1    5    0    6   11   17
     039    0    6    0    6   64   70


Searcher Overlap :
=================
Searcher
 S1  S2     A    B    C    D    E    F    G1    G2    H1    H2    I1    I2    J1    J2

 008 027    0    3    0    3    2    5 0.048 0.037 0.150 0.045 0.150 0.045 0.024 0.029
 008 032    0    0    0    0    0    0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 008 038    0    0    0    0    0    0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 008 039    0    0    0    0    1    1 0.009 0.014 0.000 0.000 0.000 0.000 0.012 0.015
 027 032    1    4    0    5    5   10 0.074 0.714 0.075 0.833 0.075 0.833 0.073 0.625
 027 038    1    5    0    6    3    9 0.067 0.529 0.090 1.000 0.090 1.000 0.044 0.272
 027 039    0    4    0    4    5    9 0.067 0.128 0.060 0.666 0.060 0.666 0.073 0.078
 032 038    0    1    0    1    0    1 0.071 0.058 0.166 0.166 0.166 0.166 0.000 0.000
 032 039    0    5    0    5    8   13 0.928 0.185 0.833 0.833 0.833 0.833 1.000 0.125
 038 039    0    1    0    1    0    1 0.058 0.014 0.166 0.166 0.166 0.166 0.000 0.000
```

```
                              QUESTION # : 023
                              DATABASE # : 032

          *********************************************************
          *  Accession Number Overlap between pairs of Searchers  *
          *********************************************************

Search Evaluation :
=================
                              ***  Proportions  ***
     A: # Relevant            G1: F in overlap between S1&S2 / F for S1
     B: # Partially Relevant  G2: F in overlap between S1&S2 / F for S2
     C: # Not Relevant        H1: D in overlap between S1&S2 / D for S1
     D: Total # Evaluated     H2: D in overlap between S1&S2 / D for S2
     E: # Not Evaluated       I1: A+B in overlap between S1&S2 / A+B for S1
     F: Total # Retrieved     I2: A+B in overlap between S1&S2 / A+B for S2
                              J1: E in overlap between S1&S2 / E for S1
                              J2: E in overlap between S1&S2 / E for S2


Total for Question :
==================

Searcher    A   B   C   D   E   F

     015   23   3   9  35   0  35
     030    1   1   4   6   0   6
     034   16   2   6  24   0  24
     035    3   4  28  35   0  35
     041   13   0   8  21   0  21


Searcher Overlap :
================
Searcher
 S1  S2     A   B   C   D   E   F    G1     G2     H1     H2     I1     I2     J1     J2

 015 030    1   0   0   1   0   1 0.028 0.166 0.028 0.166 0.038 0.500 0.000 0.000
 015 034   16   1   5  22   0  22 0.628 0.916 0.628 0.916 0.653 0.944 0.000 0.000
 015 035    2   0   1   3   0   3 0.085 0.085 0.085 0.085 0.076 0.285 0.000 0.000
 015 041    8   0   7  15   0  15 0.428 0.714 0.428 0.714 0.307 0.615 0.000 0.000
 030 034    1   0   0   1   0   1 0.166 0.041 0.166 0.041 0.500 0.055 0.000 0.000
 030 035    1   0   3   4   0   4 0.666 0.114 0.666 0.114 0.500 0.142 0.000 0.000
 030 041    1   0   0   1   0   1 0.166 0.047 0.166 0.047 0.500 0.076 0.000 0.000
 034 035    2   0   0   2   0   2 0.083 0.057 0.083 0.057 0.111 0.285 0.000 0.000
 034 041    4   0   4   8   0   8 0.333 0.380 0.333 0.380 0.222 0.307 0.000 0.000
 035 041    1   0   1   2   0   2 0.057 0.095 0.057 0.095 0.142 0.076 0.000 0.000
```

```
                         QUESTION # : 024
                         DATABASE # : 191

          ********************************************************
          *  Accession Number Overlap between pairs of Searchers  *
          ********************************************************

Search Evaluation :
=================
                            ***  Proportions  ***
     A: # Relevant          G1: F in overlap between S1&S2 / F for S1
     B: # Partially Relevant G2: F in overlap between S1&S2 / F for S2
     C: # Not Relevant      H1: D in overlap between S1&S2 / D for S1
     D: Total # Evaluated   H2: D in overlap between S1&S2 / D for S2
     E: # Not Evaluated     I1: A+B in overlap between S1&S2 / A+B for S1
     F: Total # Retrieved   I2: A+B in overlap between S1&S2 / A+B for S2
                            J1: E in overlap between S1&S2 / E for S1
                            J2: E in overlap between S1&S2 / E for S2


Total for Question :
==================

Searcher    A    B    C    D    E    F

     007    1    2    7   10    0   10
     012    1    1    4    6    0    6
     023    0    1   10   11    0   11
     025    0    0    0    0    1    1
     036    1    2    8   11    0   11


Searcher Overlap :
================
Searcher
 S1  S2     A    B    C    D    E    F     G1     G2     H1     H2     I1     I2     J1     J2

 007 012    1    1    1    3    0    3 0.300  0.500  0.300  0.500  0.666  1.000  0.000  0.000
 007 023    0    0    0    0    0    0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 007 025    0    0    0    0    0    0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 007 036    1    1    5    7    0    7 0.700  0.636  0.700  0.636  0.666  0.666  0.000  0.000
 012 023    0    0    0    0    0    0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 012 025    0    0    0    0    0    0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 012 036    1    1    2    4    0    4 0.666  0.363  0.666  0.363  1.000  0.666  0.000  0.000
 023 025    0    0    0    0    0    0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 023 036    0    0    0    0    0    0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 025 036    0    0    0    0    0    0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
```

```
                    QUESTION # : 025
                    DATABASE # : 001

         ********************************************************
         *  Accession Number Overlap between pairs of Searchers  *
         ********************************************************

Search Evaluation :
=================
                             ***  Proportions  ***
     A: # Relevant           G1: F in overlap between S1&S2 / F for S1
     B: # Partially Relevant G2: F in overlap between S1&S2 / F for S2
     C: # Not Relevant       H1: D in overlap between S1&S2 / D for S1
     D: Total # Evaluated    H2: D in overlap between S1&S2 / D for S2
     E: # Not Evaluated      I1: A+B in overlap between S1&S2 / A+B for S1
     F: Total # Retrieved    I2: A+B in overlap between S1&S2 / A+B for S2
                             J1: E in overlap between S1&S2 / E for S1
                             J2: E in overlap between S1&S2 / E for S2


Total for Question :
==================

Searcher   A   B   C   D   E   F

     002  16  15  19  50 199 249
     014   3   2   6  11  48  59
     016   0   0   3   3  33  36
     021   1   0   0   1   6   7
     033   0   0   0   0   1   1


Searcher Overlap :
================
Searcher
 S1  S2    A   B   C   D   E   F    G1    G2    H1    H2    I1    I2    J1    J2

 002 014   1   0   0   1  14  15 0.060 0.254 0.020 0.090 0.032 0.200 0.070 0.291
 002 016   0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 002 021   0   0   0   0   1   1 0.004 0.142 0.000 0.000 0.000 0.000 0.005 0.166
 002 033   0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 014 016   0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 014 021   0   0   0   0   1   1 0.016 0.142 0.000 0.000 0.000 0.000 0.020 0.166
 014 033   0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 016 021   0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 016 033   0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 021 033   0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
```

```
                         QUESTION # : 026
                         DATABASE # : 038

          ***************************************************
          *  Accession Number Overlap between pairs of Searchers  *
          ***************************************************

Search Evaluation :
=================
                              ***  Proportions  ***
     A: # Relevant            G1: F in overlap between S1&S2 / F for S1
     B: # Partially Relevant  G2: F in overlap between S1&S2 / F for S2
     C: # Not Relevant        H1: D in overlap between S1&S2 / D for S1
     D: Total # Evaluated     H2: D in overlap between S1&S2 / D for S2
     E: # Not Evaluated       I1: A+B in overlap between S1&S2 / A+B for S1
     F: Total # Retrieved     I2: A+B in overlap between S1&S2 / A+B for S2
                              J1: E in overlap between S1&S2 / E for S1
                              J2: E in overlap between S1&S2 / E for S2


Total for Question :
==================

Searcher    A    B    C    D    E    F

     012    1    0    0    1    0    1
     015    0    0    3    3    0    3
     023    8   19    0   27    0   27
     025    9    2    0   11    0   11
     036    1    1    0    2    0    2


Searcher Overlap :
================
Searcher
 S1  S2     A    B    C    D    E    F    G1    G2    H1    H2    I1    I2    J1    J2

 012 015    0    0    0    0    0    0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.00
 012 023    0    0    0    0    0    0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.00
 012 025    1    0    0    1    0    1 1.000 0.090 1.000 0.090 1.000 0.090 0.000 0.00
 012 036    1    0    0    1    0    1 1.000 0.500 1.000 0.500 1.000 0.500 0.000 0.00
 015 023    0    0    0    0    0    0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.00
 015 025    0    0    0    0    0    0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.00
 015 036    0    0    0    0    0    0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.00
 023 025    1    0    0    1    0    1 0.037 0.090 0.037 0.090 0.037 0.090 0.000 0.00
 023 036    0    0    0    0    0    0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.00
 025 036    1    0    0    1    0    1 0.090 0.500 0.090 0.500 0.090 0.500 0.000 0.00
```

```
                                 QUESTION # : 027
                                 DATABASE # : 013

               **********************************************************
               *  Accession Number Overlap between pairs of Searchers  *
               **********************************************************

Search Evaluation :
=================
                               ***  Proportions  ***
     A: # Relevant             G1: F in overlap between S1&S2 / F for S1
     B: # Partially Relevant   G2: F in overlap between S1&S2 / F for S2
     C: # Not Relevant         H1: D in overlap between S1&S2 / D for S1
     D: Total # Evaluated      H2: D in overlap between S1&S2 / D for S2
     E: # Not Evaluated        I1: A+B in overlap between S1&S2 / A+B for S1
     F: Total # Retrieved      I2: A+B in overlap between S1&S2 / A+B for S2
                               J1: E in overlap between S1&S2 / E for S1
                               J2: E in overlap between S1&S2 / E for S2


Total for Question :
==================

Searcher    A    B    C    D    E    F

     005    7   11    1   19   12   31
     011    7   19   13   39   15   54
     025   22   39   32   93   34  127
     027    8   12   11   31    7   38
     040   19   14    2   35   12   47


Searcher Overlap :
================
Searcher
 S1  S2     A    B    C    D    E    F     G1     G2     H1     H2     I1     I2     J1     J
 
 005 011    0    0    0    0    0    0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.00
 005 025    1    0    0    1    2    3 0.096  0.023  0.052  0.010  0.055  0.016  0.166  0.05
 005 027    0    0    0    0    2    2 0.064  0.052  0.000  0.000  0.000  0.000  0.166  0.28
 005 040    1    0    0    1    2    3 0.096  0.063  0.052  0.028  0.055  0.030  0.166  0.16
 011 025    0    0    0    0    1    1 0.018  0.007  0.000  0.000  0.000  0.000  0.066  0.02
 011 027    0    0    0    0    0    0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.00
 011 040    0    0    0    0    1    1 0.018  0.021  0.000  0.000  0.000  0.000  0.066  0.08
 025 027    8   12   11   31    7   38 0.299  1.000  0.333  1.000  0.327  1.000  0.205  1.00
 025 040   19   14    2   35   12   47 0.370  1.000  0.376  1.000  0.540  1.000  0.352  1.00
 027 040    7    5    0   12    2   14 0.368  0.297  0.387  0.342  0.600  0.363  0.285  0.16
```

```
                         QUESTION # : 028
                         DATABASE # : 038

          ********************************************************
          *  Accession Number Overlap between pairs of Searchers  *
          ********************************************************

Search Evaluation :
=================
                              ***  Proportions  ***
     A: # Relevant            G1: F in overlap between S1&S2 / F for S1
     B: # Partially Relevant  G2: F in overlap between S1&S2 / F for S2
     C: # Not Relevant        H1: D in overlap between S1&S2 / D for S1
     D: Total # Evaluated     H2: D in overlap between S1&S2 / D for S2
     E: # Not Evaluated       I1: A+B in overlap between S1&S2 / A+B for S1
     F: Total # Retrieved     I2: A+B in overlap between S1&S2 / A+B for S2
                              J1: E in overlap between S1&S2 / E for S1
                              J2: E in overlap between S1&S2 / E for S2


Total for Question :
==================

Searcher   A   B   C   D   E   F

     007   4  14  18  36   0  36
     012   4   5   2  11   0  11
     023   0   1   2   3   0   3
     034   1   1  12  14   0  14
     036   0   0   0   0   1   1


Searcher Overlap :
================
Searcher
 S1  S2    A   B   C   D   E   F    G1     G2     H1     H2     I1     I2     J1     J2

 007 012   4   5   2  11   0  11 0.305  1.000  0.305  1.000  0.500  1.000  0.000  0.000
 007 023   0   1   1   2   0   2 0.055  0.666  0.055  0.666  0.055  1.000  0.000  0.000
 007 034   0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 007 036   0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 012 023   0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 012 034   0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 012 036   0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 023 034   0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 023 036   0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 034 036   0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
```

```
                         QUESTION # : 029
                         DATABASE # : 008

        ***********************************************************
        *  Accession Number Overlap between pairs of Searchers  *
        ***********************************************************

Search Evaluation :
=================
                                  ***  Proportions  ***
     A: # Relevant               G1: F in overlap between S1&S2 / F for S1
     B: # Partially Relevant     G2: F in overlap between S1&S2 / F for S2
     C: # Not Relevant           H1: D in overlap between S1&S2 / D for S1
     D: Total # Evaluated        H2: D in overlap between S1&S2 / D for S2
     E: # Not Evaluated          I1: A+B in overlap between S1&S2 / A+B for S1
     F: Total # Retrieved        I2: A+B in overlap between S1&S2 / A+B for S2
                                  J1: E in overlap between S1&S2 / E for S1
                                  J2: E in overlap between S1&S2 / E for S2


Total for Question :
==================

Searcher    A    B    C    D    E    F

     011    8    8   12   28   22   50
     027   15   13   50   78   23  101
     038    3    1    1    5    3    8
     039    5    3    2   10    5   15
     040    3    0    0    3    0    3


Searcher Overlap :
================
Searcher
 S1  S2    A    B    C    D    E    F    G1     G2     H1     H2     I1     I2     J1     J2

 011 027   5    3    1    9    5   14 0.280  0.138  0.321  0.115  0.500  0.285  0.227  0.217
 011 038   3    1    1    5    3    8 0.160  1.000  0.178  1.000  0.250  1.000  0.136  1.000
 011 039   1    2    1    4    4    8 0.160  0.533  0.142  0.400  0.187  0.375  0.181  0.800
 011 040   2    0    0    2    0    2 0.040  0.666  0.071  0.666  0.125  0.666  0.000  0.000
 027 038   3    1    1    5    3    8 0.079  1.000  0.064  1.000  0.142  1.000  0.130  1.000
 027 039   2    2    1    5    3    8 0.079  0.533  0.064  0.500  0.142  0.500  0.130  0.600
 027 040   3    0    0    3    0    3 0.029  1.000  0.038  1.000  0.107  1.000  0.000  0.000
 038 039   1    0    1    2    1    3 0.375  0.200  0.400  0.200  0.250  0.125  0.333  0.200
 038 040   1    0    0    1    0    1 0.125  0.333  0.200  0.333  0.250  0.333  0.000  0.000
 039 040   1    0    0    1    0    1 0.066  0.333  0.100  0.333  0.125  0.333  0.000  0.000
```

```
                              QUESTION # : 030
                              DATABASE # : 071

          **********************************************************
          *  Accession Number Overlap between pairs of Searchers  *
          ********************************************************

Search Evaluation :
=================
                              ***  Proportions  ***
     A: # Relevant            G1: F in overlap between S1&S2 / F for S1
     B: # Partially Relevant  G2: F in overlap between S1&S2 / F for S2
     C: # Not Relevant        H1: D in overlap between S1&S2 / D for S1
     D: Total # Evaluated     H2: D in overlap between S1&S2 / D for S2
     E: # Not Evaluated       I1: A+B in overlap between S1&S2 / A+B for S1
     F: Total # Retrieved     I2: A+B in overlap between S1&S2 / A+B for S2
                              J1: E in overlap between S1&S2 / E for S1
                              J2: E in overlap between S1&S2 / E for S2


Total for Question :
==================

Searcher    A   B   C   D   E   F

     007    7   1   2  10   0  10
     012   29  14   5  48   0  48
     023   37  14   5  56   0  56
     025    2   0   0   2   0   2
     036    1   0   0   1   0   1


Searcher Overlap :
================
Searcher
 S1  S2     A   B   C   D   E   F    G1     G2     H1     H2     I1     I2     J1     J2

 007 012    1   0   0   1   0   1 0.100  0.020  0.100  0.020  0.125  0.023  0.000  0.000
 007 023    1   0   0   1   0   1 0.100  0.017  0.100  0.017  0.125  0.019  0.000  0.000
 007 025    0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 007 036    0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 012 023   29  12   3  44   0  44 0.916  0.785  0.916  0.785  0.953  0.803  0.000  0.000
 012 025    1   0   0   1   0   1 0.020  0.500  0.020  0.500  0.023  0.500  0.000  0.000
 012 036    0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 023 025    2   0   0   2   0   2 0.035  1.000  0.035  1.000  0.039  1.000  0.000  0.000
 023 036    1   0   0   1   0   1 0.017  1.000  0.017  1.000  0.019  1.000  0.000  0.000
 025 036    1   0   0   1   0   1 0.500  1.000  0.500  1.000  0.500  1.000  0.000  0.000
```

```
                              QUESTION # : 031
                              DATABASE # : 061

           *********************************************************
           *  Accession Number Overlap between pairs of Searchers  *
           *********************************************************

Search Evaluation :
=================
                             ***  Proportions  ***
     A: # Relevant           G1: F in overlap between S1&S2 / F for S1
     B: # Partially Relevant G2: F in overlap between S1&S2 / F for S2
     C: # Not Relevant       H1: D in overlap between S1&S2 / D for S1
     D: Total # Evaluated    H2: D in overlap between S1&S2 / D for S2
     E: # Not Evaluated      I1: A+B in overlap between S1&S2 / A+B for S1
     F: Total # Retrieved    I2: A+B in overlap between S1&S2 / A+B for S2
                             J1: E in overlap between S1&S2 / E for S1
                             J2: E in overlap between S1&S2 / E for S2


Total for Question :
==================

Searcher   A   B   C   D   E   F

     007   1   0  19  20   0  20
     012   6   6  34  46   0  46
     023  10  12  41  63   0  63
     025   5   4  18  27   0  27
     036   3   0   8  11   0  11


Searcher Overlap :
================
Searcher
 S1  S2    A   B   C   D   E   F    G1    G2    H1    H2    I1    I2    J1    J2

 007 012   0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 007 023   0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 007 025   0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 007 036   0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 012 023   5   4  13  22   0  22 0.478 0.349 0.478 0.349 0.750 0.409 0.000 0.000
 012 025   5   4  13  22   0  22 0.478 0.814 0.478 0.814 0.750 1.000 0.000 0.000
 012 036   3   0   8  11   0  11 0.239 1.000 0.239 1.000 0.250 1.000 0.000 0.000
 023 025   5   4  18  27   0  27 0.428 1.000 0.428 1.000 0.409 1.000 0.000 0.000
 023 036   2   0   7   9   0   9 0.142 0.818 0.142 0.818 0.090 0.666 0.000 0.000
 025 036   2   0   7   9   0   9 0.333 0.818 0.333 0.818 0.222 0.666 0.000 0.000
```

```
                              QUESTION # : 032
                              DATABASE # : 008

          ********************************************************
          *  Accession Number Overlap between pairs of Searchers  *
          ********************************************************

Search Evaluation :
=================
                            ***  Proportions  ***
     A: # Relevant          G1: F in overlap between S1&S2 / F for S1
     B: # Partially Relevant G2: F in overlap between S1&S2 / F for S2
     C: # Not Relevant      H1: D in overlap between S1&S2 / D for S1
     D: Total # Evaluated   H2: D in overlap between S1&S2 / D for S2
     E: # Not Evaluated     I1: A+B in overlap between S1&S2 / A+B for S1
     F: Total # Retrieved   I2: A+B in overlap between S1&S2 / A+B for S2
                            J1: E in overlap between S1&S2 / E for S1
                            J2: E in overlap between S1&S2 / E for S2


Total for Question :
==================

Searcher    A   B   C   D   E   F

     001    6   0   0   6   0   6
     008   42   3   0  45  74 119
     017    0   1  17  18   0  18
     029   34   4   0  38 112 150
     032   58   2   0  60 119 179


Searcher Overlap :
================
Searcher
 S1  S2     A   B   C   D   E   F    G1    G2    H1    H2    I1    I2    J1    J2

 001 008    4   0   0   4   0   4 0.666 0.033 0.666 0.088 0.666 0.088 0.000 0.000
 001 017    0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 001 029    2   0   0   2   0   2 0.333 0.013 0.333 0.052 0.333 0.052 0.000 0.000
 001 032    4   0   0   4   0   4 0.666 0.022 0.666 0.066 0.666 0.066 0.000 0.000
 008 017    0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 008 029   22   2   0  24  44  68 0.571 0.453 0.533 0.631 0.533 0.631 0.594 0.392
 008 032   19   0   0  19  35  54 0.453 0.301 0.422 0.316 0.422 0.316 0.472 0.294
 017 029    0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 017 032    0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 029 032   19   0   0  19  58  77 0.513 0.430 0.500 0.316 0.500 0.316 0.517 0.487
```

```
                              QUESTION # : 033
                              DATABASE # : 008

         *******************************************************
         *  Accession Number Overlap between pairs of Searchers  *
         *******************************************************

Search Evaluation :
=================
                              ***  Proportions  ***
     A: # Relevant            G1: F in overlap between S1&S2 / F for S1
     B: # Partially Relevant  G2: F in overlap between S1&S2 / F for S2
     C: # Not Relevant        H1: D in overlap between S1&S2 / D for S1
     D: Total # Evaluated     H2: D in   overlap between S1&S2 / D for S2
     E: # Not Evaluated       I1: A+B in overlap between S1&S2 / A+B for S1
     F: Total # Retrieved     I2: A+B in overlap between S1&S2 / A+B for S2
                              J1: E in overlap between S1&S2 / E for S1
                              J2: E in overlap between S1&S2 / E for S2

Total for Question :
==================

Searcher    A    B    C    D    E    F

     001    0    0    0    0    1    1
     008    0    0    3    3    2    5
     017    3    0    0    3    4    7
     029    1    0    0    1    1    2
     032   15   26    6   47   38   85

Searcher Overlap :
================
Searcher
 S1  S2     A    B    C    D    E    F     G1     G2     H1     H2     I1     I2     J1     J2

 001 008    0    0    0    0    0    0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 001 017    0    0    0    0    0    0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 001 029    0    0    0    0    0    0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 001 032    0    0    0    0    0    0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 008 017    0    0    0    0    0    0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 008 029    0    0    0    0    0    0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 008 032    0    0    0    0    0    0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 017 029    0    0    0    0    0    0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 017 032    0    0    0    0    0    0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 029 032    1    0    0    1    0    1 0.500  0.011  1.000  0.021  1.000  0.024  0.000  0.000
```

```
                              QUESTION # : 034
                              DATABASE # : 013

              ********************************************************
              *  Accession Number Overlap between pairs of Searchers  *
              ********************************************************

Search Evaluation :
=================
                               ***  Proportions  ***
     A: # Relevant             G1: F in overlap between S1&S2 / F for S1
     B: # Partially Relevant   G2: F in overlap between S1&S2 / F for S2
     C: # Not Relevant         H1: D in overlap between S1&S2 / D for S1
     D: Total # Evaluated      H2: D in overlap between S1&S2 / D for S2
     E: # Not Evaluated        I1: A+B in overlap between S1&S2 / A+B for S1
     F: Total # Retrieved      I2: A+B in overlap between S1&S2 / A+B for S2
                               J1: E in overlap between S1&S2 / E for S1
                               J2: E in overlap between S1&S2 / E for S2


Total for Question :
==================

Searcher    A   B   C   D   E   F

     001    1   2   0   3   0   3
     008    4  12  70  86 186 272
     017    0   4   5   9   1  10
     029    1  13   7  21   0  21
     032    0   1   0   1   0   1


Searcher Overlap :
================
Searcher
 S1  S2     A   B   C   D   E   F    G1    G2    H1    H2    I1    I2    J1    J2

 001 008    0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 001 017    0   1   0   1   0   1 0.333 0.100 0.333 0.111 0.333 0.250 0.000 0.000
 001 029    0   1   0   1   0   1 0.333 0.047 0.333 0.047 0.333 0.071 0.000 0.000
 001 032    0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 008 017    0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 008 029    0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 008 032    0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 017 029    0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 017 032    0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 029 032    0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
```

```
                    QUESTION # : 035
                    DATABASE # : 154

        ********************************************************
        *  Accession Number Overlap between pairs of Searchers  *
        ********************************************************

Search Evaluation :
=================
                                ***  Proportions  ***
     A: # Relevant              G1: F in overlap between S1&S2 / F for S1
     B: # Partially Relevant    G2: F in overlap between S1&S2 / F for S2
     C: # Not Relevant          H1: D in overlap between S1&S2 / D for S1
     D: Total # Evaluated       H2: D in overlap between S1&S2 / D for S2
     E: # Not Evaluated         I1: A+B in overlap between S1&S2 / A+B for S1
     F: Total # Retrieved       I2: A+B in overlap between S1&S2 / A+B for S2
                                J1: E in overlap between S1&S2 / E for S1
                                J2: E in overlap between S1&S2 / E for S2


Total for Question :
==================

Searcher    A   B   C   D   E   F

     001    1   0   0   1   0   1
     008    6   5   5  16   0  16
     017    1   0   0   1   0   1
     029   12   4   6  22   0  22
     032    9  10   3  22   0  22


Searcher Overlap :
================
Searcher
 S1  S2     A   B   C   D   E   F    G1     G2     H1     H2     I1     I2     J1     J2

 001 008    0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 001 017    1   0   0   1   0   1 1.000  1.000  1.000  1.000  1.000  1.000  0.000  0.000
 001 029    0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 001 032    0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 008 017    0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 008 029    4   0   0   4   0   4 0.250  0.181  0.250  0.181  0.363  0.250  0.000  0.000
 008 032    1   2   1   4   0   4 0.250  0.181  0.250  0.181  0.272  0.157  0.000  0.000
 017 029    0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 017 032    0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 029 032    1   1   0   2   0   2 0.090  0.090  0.090  0.090  0.125  0.105  0.000  0.000
```

```
                              QUESTION # : 036
                              DATABASE # : 090

         **********************************************************
         *  Accession Number Overlap between pairs of Searchers  *
         **********************************************************

Search Evaluation :
=================
                              ***  Proportions  ***
     A: # Relevant            G1: F in overlap between S1&S2 / F for S1
     B: # Partially Relevant  G2: F in overlap between S1&S2 / F for S2
     C: # Not Relevant        H1: D in overlap between S1&S2 / D for S1
     D: Total # Evaluated     H2: D in overlap between S1&S2 / D for S2
     E: # Not Evaluated       I1: A+B in overlap between S1&S2 / A+B for S1
     F: Total # Retrieved     I2: A+B in overlap between S1&S2 / A+B for S2
                              J1: E in overlap between S1&S2 / E for S1
                              J2: E in overlap between S1&S2 / E for S2


Total for Question :
==================

Searcher    A   B   C   D   E   F

     007   13  13  11  37  36  73
     012    5   2   5  12   0  12
     023   20  17  13  50  12  62
     025   31  13  12  56   0  56
     036   28   9  10  47   0  47


Searcher Overlap :
================
Searcher
 S1  S2     A   B   C   D   E   F    G1     G2     H1     H2     I1     I2     J1     J2

 007 012    1   0   0   1   0   1 0.013  0.083  0.027  0.083  0.038  0.142  0.000  0.000
 007 023    0   0   0   0   0   0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 007 025    2   0   1   3   0   3 0.041  0.053  0.081  0.053  0.076  0.045  0.000  0.000
 007 036    2   0   1   3   0   3 0.041  0.063  0.081  0.063  0.076  0.054  0.000  0.000
 012 023    2   0   0   2   0   2 0.166  0.032  0.166  0.040  0.285  0.054  0.000  0.000
 012 025    4   2   1   7   0   7 0.583  0.125  0.583  0.125  0.857  0.136  0.000  0.000
 012 036    4   2   1   7   0   7 0.583  0.148  0.583  0.148  0.857  0.162  0.000  0.000
 023 025    9   5   0  14   0  14 0.225  0.250  0.280  0.250  0.378  0.318  0.000  0.000
 023 036    9   5   0  14   0  14 0.225  0.297  0.280  0.297  0.378  0.378  0.000  0.000
 025 036   28   8  10  46   0  46 0.821  0.978  0.821  0.978  0.818  0.972  0.000  0.000
```

```
                         QUESTION # : 037
                         DATABASE # : 016

          **********************************************************
          *  Accession Number Overlap between pairs of Searchers  *
          **********************************************************

Search Evaluation :
=================
                              ***  Proportions  ***
     A: # Relevant            G1: F in overlap between S1&S2 / F for S1
     B: # Partially Relevant  G2: F in overlap between S1&S2 / F for S2
     C: # Not Relevant        H1: D in overlap between S1&S2 / D for S1
     D: Total # Evaluated     H2: D in overlap between S1&S2 / D for S2
     E: # Not Evaluated       I1: A+B in overlap between S1&S2 / A+B for S1
     F: Total # Retrieved     I2: A+B in overlap between S1&S2 / A+B for S2
                              J1: E in overlap between S1&S2 / E for S1
                              J2: E in overlap between S1&S2 / E for S2


Total for Question :
==================

Searcher    A   B   C   D   E   F

     015   11   3  33  47  25  72
     030    3   0   2   5   0   5
     034   16   1   6  23   2  25
     035   29   1   6  36  19  55
     041   31   6  10  47  26  73


Searcher Overlap :
================
Searcher
 S1  S2     A   B   C   D   E   F    G1    G2    H1    H2    I1    I2    J1    J2

 015 030    1   0   0   1   0   1 0.013 0.200 0.021 0.200 0.071 0.333 0.000 0.000
 015 034    0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 015 035    0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 015 041    0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 030 034    0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 030 035    0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 030 041    0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 034 035    9   0   5  14   2  16 0.640 0.290 0.608 0.388 0.529 0.300 1.000 0.105
 034 041    9   0   2  11   0  11 0.440 0.150 0.478 0.234 0.529 0.243 0.000 0.000
 035 041   15   0   2  17   1  18 0.327 0.246 0.472 0.361 0.500 0.405 0.052 0.038
```

```
                              QUESTION # : 038
                              DATABASE # : 061

          *********************************************************
          *  Accession Number Overlap between pairs of Searchers  *
          *********************************************************

Search Evaluation :
=================
                             ***  Proportions  ***
     A: # Relevant           G1: F in overlap between S1&S2 / F for S1
     B: # Partially Relevant G2: F in overlap between S1&S2 / F for S2
     C: # Not Relevant       H1: D in overlap between S1&S2 / D for S1
     D: Total # Evaluated    H2: D in overlap between S1&S2 / D for S2
     E: # Not Evaluated      I1:: A+B in overlap between S1&S2 / A+B for S1
     F: Total # Retrieved    I2: A+B in overlap between S1&S2 / A+B for S2
                             J1: E in overlap between S1&S2 / E for S1
                             J2: E in overlap between S1&S2 / E for S2


Total for Question :
==================

Searcher   A   B   C   D   E   F

     015   8   5   3  16  53  69
     030   6   9  19  34 240 274
     034   8   1   4  13  32  45
     035   6   2   2  10  15  25
     041  29   8   3  40  64 104


Searcher Overlap :
================
Searcher
 S1  S2    A   B   C   D   E   F    G1    G2    H1    H2    I1    I2    J1    J2

 015 030   0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 015 034   0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 015 035   0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 015 041   2   1   0   3   4   7 0.101 0.067 0.187 0.075 0.230 0.081 0.075 0.062
 030 034   0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 030 035   0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 030 041   0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 034 035   0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 034 041   0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 035 041   0   0   0   0   0   0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
```

```
                              QUESTION # : 039
                              DATABASE # : 015

          ********************************************************
          *  Accession Number Overlap between pairs of Searchers  *
          ********************************************************

Search Evaluation :
=================
                            ***  Proportions  ***
     A: # Relevant          G1: F in overlap between S1&S2 / F for S1
     B: # Partially Relevant G2: F in overlap between S1&S2 / F for S2
     C: # Not Relevant      H1: D in overlap between S1&S2 / D for S1
     D: Total # Evaluated   H2: D in overlap between S1&S2 / D for S2
     E: # Not Evaluated     I1: A+B in overlap between S1&S2 / A+B for S1
     F: Total # Retrieved   I2: A+B in overlap between S1&S2 / A+B for S2
                            J1: E in overlap between S1&S2 / E for S1
                            J2: E in overlap between S1&S2 / E for S2


Total for Question :
==================

Searcher    A    B    C    D    E    F

     015    0    0    0    0    1    1
     030    4    3    7   14    0   14
     034    2    5    5   12    0   12
     035    0    0    6    6    0    6
     041    1    0    1    2    0    2


Searcher Overlap :
================
Searcher
 S1  S2     A    B    C    D    E    F    G1    G2    H1    H2    I1    I2    J1    J2

 015 030    0    0    0    0    0    0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 015 034    0    0    0    0    0    0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 015 035    0    0    0    0    0    0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 015 041    0    0    0    0    0    0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 030 034    0    0    0    0    0    0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 030 035    0    0    0    0    0    0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 030 041    0    0    0    0    0    0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 034 035    0    0    0    0    0    0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 034 041    0    0    0    0    0    0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
 035 041    0    0    0    0    0    0 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
```

```
                            QUESTION # : 040
                            DATABASE # : 016

          ********************************************************
          *  Accession Number Overlap between pairs of Searchers  *
          ********************************************************

Search Evaluation :
=================
                             ***  Proportions  ***
     A: # Relevant           G1: F in overlap between S1&S2 / F for S1
     B: # Partially Relevant G2: F in overlap between S1&S2 / F for S2
     C: # Not Relevant       H1: D in overlap between S1&S2 / D for S1
     D: Total # Evaluated    H2: D in overlap between S1&S2 / D for S2
     E: # Not Evaluated      I1: A+B in overlap between S1&S2 / A+B for S1
     F: Total # Retrieved    I2: A+B in overlap between S1&S2 / A+B for S2
                             J1: E in overlap between S1&S2 / E for S1
                             J2: E in overlap between S1&S2 / E for S2


Total for Question :
==================

Searcher    A    B    C    D    E    F

     015   10    6    0   16   61   77
     030    2    4   32   38    4   42
     034    6    2    0    8    7   15
     035   11    4    0   15   47   62
     041   16    9    0   25   18   43


Searcher Overlap :
================
Searcher
 S1  S2     A    B    C    D    E    F     G1     G2     H1     H2     I1     I2     J1     J2

 015 030    1    0    0    1    0    1 0.012  0.023  0.062  0.026  0.062  0.166  0.000  0.000
 015 034    1    0    0    1    0    1 0.012  0.066  0.062  0.125  0.062  0.125  0.000  0.000
 015 035    0    0    0    0    3    3 0.038  0.048  0.000  0.000  0.000  0.000  0.049  0.063
 015 041    1    0    0    1    0    1 0.012  0.023  0.062  0.040  0.062  0.040  0.000  0.000
 030 034    2    0    0    2    1    3 0.071  0.200  0.052  0.250  0.333  0.250  0.250  0.142
 030 035    0    0    0    0    0    0 0.000  0.000  0.000  0.000  0.000  0.000  0.000  0.000
 030 041    2    0    0    2    1    3 0.071  0.069  0.052  0.080  0.333  0.080  0.250  0.055
 034 035    2    1    0    3    1    4 0.266  0.064  0.375  0.200  0.375  0.200  0.142  0.021
 034 041    2    1    0    3    3    6 0.400  0.139  0.375  0.120  0.375  0.120  0.428  0.166
 035 041    1    1    0    2    3    5 0.080  0.116  0.133  0.080  0.133  0.080  0.063  0.166
```

APPENDIX E. GROUPS OF QUESTIONS SEARCHED BY SETS OF OUTSIDE SEARCHERS

The 40 questions can be grouped by type of question as follows:

Group 1 - Medical
Group 2 - Psychology and Sociology
Group 3 - Business Management
Group 4 - Scientific and Technical
Group 5 - Business and Science
Group 6 - Humanities and Social Science
Group 7 - Miscellaneous

For each group of questions, the searcher numbers of the five outside searchers who searched the question are noted. This compilation shows the specific questions searched in common by the various individual searchers.

Appendix E

GROUPS OF QUESTIONS SEARCHED BY SETS OF OUTSIDE SEARCHERS

Group 1 - Medical Questions

Searcher Number	Question Number Q004	Q008	Q010	Q011	Q015
S009	X	X	X	X	X
S010	X	X	X	X	X
S024	X	X	X	X	X
S028	X	X	X	X	X
S037	X	X	X	X	X

Group 2 - Psychology and Sociology Questions

Searcher Number	Question Number Q001	Q003	Q009	Q016	Q021	Q025
S002	X	X	X	X	X	X
S005	X			X		
S013	X			X		
S014		X	X		X	X
S016	X	X	X	X	X	X
S021	X	X	X	X	X	X
S033		X	X		X	X

Group 3 - Business Management Questions

Searcher Number	Question Number					
	Q002	Q005	Q007	Q013	Q014	Q018
S003	X	X	X	X	X	X
S004	X	X	X	X	X	X
S006	X	X	X	X	X	X
S013		X		X		
S014			X			X
S026	X	X	X	X	X	X
S033	X				X	

Group 4 - Scientific and Technical Questions

Searcher Number	Question Number					
	Q006	Q012	Q017	Q022	Q027	Q029
S005		X			X	
S008				X		
S011	X	X	X		X	X
S025					X	
S027	X	X	X	X	X	X
S029		X				
S032				X		
S038	X		X	X		X
S039	X		X	X		X
S040	X	X	X		X	X

Group 5 - Business and Science Questions

Searcher Number	Question Number					
	Q019	Q020	Q032	Q033	Q034	Q035
S001	X	X	X	X	X	X
S005	X	X				
S008	X		X	X	X	X
S013	X	X				
S017	X	X	X	X	X	X
S029			X	X	X	X
S032		X	X	X	X	X

Group 6 - Humanities and Social Science Questions

Searcher Number	Question Number					
	Q024	Q026	Q028	Q030	Q031	Q036
S007	X		X	X	X	X
S012	X	X	X	X	X	X
S015		X				
S023	X	X	X	X	X	X
S025	X	X		X	X	X
S034			X			
S036	X	X	X	X	X	X

Group 7 - Miscellaneous Questions

Searcher Number	Question Number				
	Q023	Q037	Q038	Q039	Q040
S015	X	X	X	X	X
S030	X	X	X	X	X
S034	X	X	X	X	X
S035	X	X	X	X	X
S041	X	X	X	X	X

APPENDIX F. FLOWCHARTS FOR OVERALL DESIGN OF THE PROJECT

F-1 - LIST OF EXPERIMENTS

List of the experiments for the overall design of the project and referenced in subsequest flowcharts

F-2 - OVERALL DESIGN OF THE PROJECT - FLOWCHART 1

Flowchart showing the major steps in conducting the experiments for the project

F-3 DESIGN OF THE PROJECT FOR QUESTION ANALYSIS - FLOWCHART 2

Flowchart showing the major steps in question analysis and classification

F-4 DESIGN OF THE PROJECT FOR USER QUESTIONS FOR ONLINE SEARCHING - FLOWCHART 3

Flowchart showing the major steps for conducting the 360 online searches for the 40 questions

F-5 QUESTION ANALYSIS CHART - FLOWCHART 4

Flowchart showing the major steps for question analysis and classification

NSF PROJECT IST-8505411

EXPERIMENTS IN THE COGNITIVE ASPECTS OF INFORMATION SEEKING AND INFORMATION RETRIEVING

LIST OF EXPERIMENTS

NUMBER	TITLE
1	VALIDATION OF CONTEXT ELEMENTS
2	EFFECTS OF CONTEXT
3	REQUEST STRUCTURE
4	REQUEST CLASSIFICATION
5	EFFECTS OF REQUEST CLASSES
6	NATURE OF REQUEST ANALYSIS AND SEARCH STRATEGY PROCESSES
7	ELABORATION OF CONCEPTS
8	SEARCH TACTICS
9	AGREEMENT ON SEARCH STATEMENTS
10	COGNITIVE CHARACTERISTICS
11	COGNITIVE CHARACTERISTICS AND PERFORMANCE

NSF PROJECT IST-8505411
EXPERIMENTS IN THE COGNITIVE ASPECTS OF INFORMATION SEEKING AND INFORMATION RETRIEVING

OVERALL DESIGN OF PROJECT - FLOWCHART 1

OBTAIN QUESTIONS FOR THE EXPERIMENTS
|
|
CONTACT LIBRARIES THAT PERFORM ONLINE SEARCHES
|
|
SELECT 160 QUESTIONS (GROUP 1) FOR WHICH ONLINE SEARCHES HAVE BEEN COMPLETED
|
|
ANALYZE REQUEST STRUCTURE AND CLASSIFICATION (EXP. 3, 4) FOR GROUP 1 (F11)
|
|
CONTACT USERS WITH QUESTIONS NEEDING ONLINE SEARCHES (F1)
|
|
SELECT 40 USER QUESTIONS (GROUP 2) FOR EXPERIMENTS ON ONLINE SEARCHING
|
|
CONTACT SEARCHERS TO CONDUCT ONLINE SEARCHES FOR GROUP 2 (F2-3;C1)
|
|
SELECT 38 SEARCHERS FOR ONLINE SEARCHES FOR GROUP 2
|
|
DETERMINE THE COGNITIVE SCORES OF EACH ONLINE SEARCHER (EXP. 10)
|
|
OBTAIN WRITTEN QUESTIONS FOR GROUP 2 (F4,5;P1,C2)
|
|
ANALYZE REQUEST STRUCTURE AND CLASSIFICATION FOR GROUP 2 (EXP. 3, 4)(F11)
|
|
CONDUCT AND TAPE USER INTERVIEWS FOR GROUP 2 QUESTIONS (F6-9,P2)
DETERMINE THE CONTEXT VALUES FOR EACH USER AND SEARCHER (EXP. 1)
|
|
CONDUCT 360 ONLINE SEARCHES USING DIFFERENT SEARCH STRATEGIES (9 DIFFERENT
SEARCHES FOR EACH GROUP 2 QUESTION) (EXP. 2, 7, 11)(F10,13,P3-8)
|
|
MERGE RESULTS FROM ALL ONLINE SEARCHES OF GROUP 2 QUESTIONS
|
|
SEND SEARCH RESULTS FOR GROUP 2 TO USERS FOR
EVALUATION OF EFFECTIVENESS (F12,14)
|
TO PAGE 2 OF PROJECT FLOWCHART

(EXP.= EXPERIMENT #; C = CODE FORMS #; F = FORM #; P = PROCEDURE #)

OVERALL DESIGN OF PROJECT - FLOWCHART (Page 2)

FROM PAGE 1 OF PROJECT FLOWCHART 1

|

|

DETERMINE THE EFFECTIVENESS OF EACH OF THE
360 SEARCHES OF GROUP 2 QUESTIONS

|

|

DETERMINE THE EFFICIENCY OF THE
360 SEARCHES OF GROUP 2 QUESTIONS

|

|

DETERMINE THE SEARCH TACTICS USED FOR
THE 360 SEARCHES OF GROUP 2 QUESTIONS (EXP. 8)

|

|

DETERMINE THE EFFECT OF CONTEXT VALUES ON EFFECTIVENESS
AND EFFICIENCY (EXP. 2) FOR ALL GROUP 2 QUESTIONS

|

|

DETERMINE EFFECTS OF REQUEST CLASSIFICATION ON EFFECTIVENESS
AND EFFICIENCY (EXP. 5) FOR ALL GROUP 2 QUESTIONS

|

|

DETERMINE EFFECTS OF 4 SEARCH STRATEGIES BASED ON CONCEPT ELABORATION
ON EFFECTIVENESS AND EFFICIENCY (EXP. 7) FOR ALL GROUP 2 QUESTIONS

|

|

DETERMINE EFFECTS OF DIFFERENT SEARCH TACTICS ON
EFFECTIVENESS AND EFFICIENCY (EXP. 8) FOR ALL GROUP 2 QUESTIONS

|

|

DETERMINE EFFECTS OF COGNITIVE SCORES ON EFFECTIVENESS
AND EFFICIENCY (EXP. 11) FOR ALL GROUP 2 QUESTIONS

|

|

SELECT 5 QUESTIONS FROM GROUP 2 (GROUP 2A) FOR FURTHER ANALYSIS

|

|

CONDUCT ONLINE SEARCHES AND TAPE THE SEARCH PROTOCOLS
FOR OUTSIDE SEARCHERS FOR GROUP 2A QUESTIONS

|

|

DETERMINE THE PROCESSES USED IN REQUEST ANALYSIS AND
SEARCH STRATEGY FORMULATION (EXP. 6) FOR GROUP 2A QUESTIONS

|

|

ADD 4 QUESTIONS (GROUP 3) FROM DR. WOELFL DISSERTATION

|

|

DETERMINE THE DEGREE OF AGREEMENT ON
SEARCH STATEMENTS FOR GROUPS 2 AND 3 QUESTIONS (EXP. 9)

|

|

DETERMINE THE EFFECT OF COGNITIVE SCORES ON THE DEGREE
OF AGREEMENT VALUES FOR GROUPS 2 AND 3 QUESTIONS (EXP. 10)

NSF PROJECT IST-8505411
EXPERIMENTS IN THE COGNITIVE ASPECTS OF INFORMATION SEEKING AND INFORMATION RETRIEVING

OVERALL DESIGN OF PROJECT - FLOWCHART

DESIGN OF PROJECT FOR QUESTION ANALYSIS FLOWCHART #2

OBTAIN QUESTIONS FOR THE EXPERIMENTS

|

|

CONTACT LIBRARIES THAT PERFORM ONLINE SEARCHES

|

|

SOURCES USED WERE:
UNIVERSITY OF DAYTON
CWRU MEDICAL LIBRARY
AMERICAN SOCIETY FOR METALS
CHAMIS DISSERTATION MATERIAL
WOELFL DISSERTATION MATERIAL

|

|

SELECT 160 QUESTIONS (GROUP 1) FOR WHICH ONLINE SEARCHES HAVE BEEN COMPLETED

|

|

SAMPLE QUESTIONS
#38 The effects of aging on person's self image and ability
to cope with the process (age group - elderly)

|

|

ANALYZE REQUEST STRUCTURE AND CLASSIFICATION (EXP. 3, 4) FOR GROUP 1 (F11)

|

|

SAMPLE QUESTION ANALYSIS (FORM 11)

|

|

EXP. 3 REQUEST STRUCTURE
ANALYSIS OF QUESTION TO DETERMINE THE PRESENCE
OF ONE OR MORE OF THE THREE BASIC ELEMENTS

(1) SUBJECT - THE CENTRAL CONCEPT OF THE SEARCH
#38- a) aging; b) person's self-image; c)process
(2) QUERY - THE SPECIFIC ASPECT ASKED ABOUT THE SUBJECT
#38 -a) effects; b) ability to cope
(3) LEAD-IN - PHRASE PRECEDING SUBJECT OR QUERY AND NOT DIRECTLY SEARCHABLE
#38 - none but examples are - what, where, interested in, why

The subject or the query may sometimes also have
MODIFERS and/or CONSTRAINTS

(1) MODIFIERS - MORE SPECIFIC OR ALTERNATIVE CONCEPTS FOR THE SUBJECT OR QUERY
(2) CONSTRAINTS - limitations on the type of information provided,
For #38 = 1 (current)

|

TO PAGE 2

DESIGN OF PROJECT FOR QUESTION ANALYSIS FLOWCHART #2 (PAGE 2)

FROM PAGE 1

|

|

EXP. 4 REQUEST CLASSIFICATION

REQUESTS ARE CLASSIFIED ACCORDING TO 4 ATTRIBUTES

(1) DOMAIN - Number of Dialindex categories to which search could be assigned
#38 -1) Pyschology; 2) Social Science; 3) Meline; 4) Scisearch

(2) CLARITY - The average value of two scaled measures, range 1 to 5, #38 = 4.5
- a) Semantics - the meaning of the terms - #38 = 5
- b) Syntax - the relation between terms - #38 = 4

(3) SPECIFICITY - The average value of scaled measures for the hierarchical level from general (meta language) to specific (object language) for each subject and query, ranging from 1 to 5. For #38 = 3.9

(4) COMPLEXITY - Consists of 2 values
- a) # search concepts; for #38 = 3
- B) # constraints; for #38 = 1

TESTS will be conducted to determine the degree of fit to the model and the degree of agreeement between two analysts

(Exp.= Experiment #; C=Code Forms #; F=Form #; P= Procedure #)

NSF PROJECT IST-8505411
EXPERIMENTS IN THE COGNITIVE ASPECTS OF INFORMATION SEEKING AND INFORMATION RETRIEVING

DESIGN OF PROJECT FOR USER QUESTIONS FOR ONLINE SEARCHING
FLOWCHART #3

CONTACT USERS WITH QUESTIONS NEEDING ONLINE SEARCHES (F1)
|
|
SOURCES CONTACTED WERE:
CAMPUS NEWS ARTICLE
FLYERS SENT TO ALL CASE WESTERN RESERVE
DEPARTMENTS WITH GRADUATE STUDENTS
FLYERS POSTED ON MAJOR BULLETIN BOARDS ON CAMPUS
FLYERS SENT TO OTHER CAMPUSES
AKRON UNIVERSITY, CLEVELAND STATE UNIVERSITY,
JOHN CARROLL UNIVERSITY, KENT STATE UNIVERSITY
FLYERS & LETTERS SENT TO MEMBERS OF
SPECIAL LIBRARIES ASSOCIATION, CLEVELAND CHAPTER
NORTHEAST OHIO AMERICAN SOCIETY FOR INFORMATION SCIENCE
CLEVELAND ONLINE USERS GROUP
|
|
SELECT 40 USER QUESTIONS (GROUP 2) FOR EXPERIMENTS ON ONLINE SEARCHING
|
|
CONTACT SEARCHERS TO CONDUCT ONLINE SEARCHES FOR GROUP 2 (F2-3;C1)
|
|
SOURCES CONTACTED WERE:
SPECIAL LIBRARIES ASSOCIATION, CLEVELAND CHAPTER
NORTHEAST OHIO AMERICAN SOCIETY FOR INFORMATION SCIENCE
CLEVELAND ONLINE USERS GROUP
|
|
SELECT 38 SEARCHERS FOR ONLINE SEARCHES FOR GROUP 2
|
|
DETERMINE THE COGNITIVE SCORES OF EACH ONLINE SEARCHER (EXP. 10)
|
|
THREE COGNITIVE TESTS ARE USED
LEARNING STYLE INVENTORY
REMOTE ASSOCIATES TEST
EMPLOYEE APTITUTE SURVEY
|
|
TO PAGE 2

(Exp. = EXPERIMENT #; C= CODE FORMS #; F = FORM #; P= PROCEDURE #)

DESIGN OF PROJECT FOR USER QUESTIONS FOR ONLINE SEARCHING
FLOWCHART #3 (page 2)

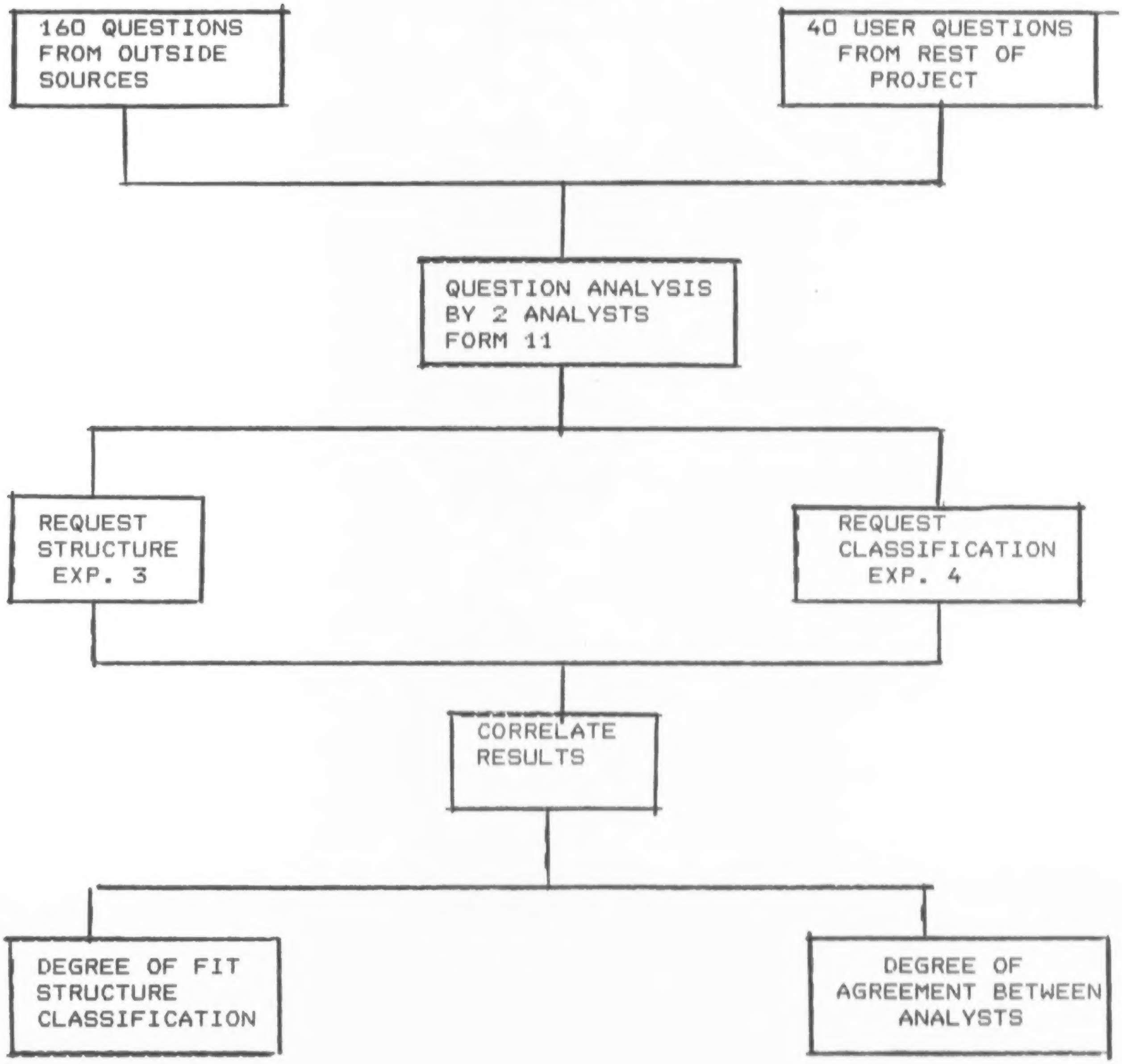
OBTAIN WRITTEN QUESTIONS FOR GROUP 2 (F4,5;P1,C2)
|
|
SAMPLE QUESTIONS - QUESTION #11
WHAT ARE THE PYSCHOEMOTIONAL AND PSYCOSOCIAL RESPONSES OF PARENTS
AND SURVIVING SIBLINGS TO THE DEATH OF AN INFANT, DUE TO
SUDDEN INFANT DEATH SYNDROME (S.I.D.S.; ALSO CALLED "CRIB DEATH")
AND WHAT ARE THE COPING STRATEGIES TO THESE FAMILY MEMBERS?
|
|
ANALYZE REQUEST STRUCTURE AND CLASSIFICATION FOR GROUP 2 (EXP. 3, 4)(F11)
|
|
CONDUCT AND TAPE USER INTERVIEWS FOR GROUP 2 QUESTIONS (F6-9,P2)
DETERMINE THE CONTEXT VALUES FOR EACH USER AND SEARCHER (EXP. 1)
|
|
CONTEXT VALUES FOR QUESTION #11
POSSIBLE VALUES RANGE FROM 1 TO 5
PROBLEM DEFINITION SCALE- USER 3; SEARCHERS -P.S. 4
INTENT SCALE - USER 2; SEARCHERS- P.S. 1
PROBLEM-PUBLIC KNOWLEDGE SCALE - USER 4; SEARCHERS - P.S. 3; 5, 5, 3, 5, 4
INTERNAL KNOWLEDGE SCALE - USER 4; SEARCHERS - P.S. 1; 2, 4, 1, 4, 3
|
|
CONDUCT 360 ONLINE SEARCHES USING DIFFERENT SEARCH STRATEGIES (9 DIFFERENT
SEARCHES FOR EACH GROUP 2 QUESTION) (EXP. 2, 7, 11)(F10,13,P3-8)
|
|
9 SEARCHES FOR QUESTION #11
OUTSIDE SEARCHERS 009, 024, 028, 010, 037
PROJECT SEARCHES 119, 219, 319, 419
|
|
SEARCH RESULTS FOR QUESTION #11
#REFERENCES - 9, 98, 45, 54, 5, 198, 144, 21, 30
TOTAL 604
|
|
MERGE RESULTS FROM ALL ONLINE SEARCHES OF GROUP 2 QUESTIONS
|
|
MERGED SET FOR QUESTION #11- 310
|
|
SEND SEARCH RESULTS FOR GROUP 2 TO USERS FOR
EVALUATION OF EFFECTIVENESS (F12,14)
|
|
150 ABSTRACTS SENT TO THE USER FOR EVALUATION FOR QUESTION #11
|
|
EVALUATION RECEIVED FOR QUESTION #11
RELEVANT= 9; PARTIALLY RELEVANT = 16; NOT RELEVANT = 125
|
|
EVALUATION CODES ENTERED FOR PROCESSING
BY COMPUTER PROGRAMS

NSF PROJECT IST-8505411

EXPERIMENTS IN THE COGNITIVE ASPECTS OF
INFORMATION SEEKING AND INFORMATION RETRIEVING

QUESTION ANALYSIS CHART

FLOWCHART #4


160 QUESTIONS FROM OUTSIDE SOURCES
40 USER QUESTIONS FROM REST OF PROJECT
QUESTION ANALYSIS BY 2 ANALYSTS FORM 11
REQUEST STRUCTURE EXP. 3
REQUEST CLASSIFICATION EXP. 4
CORRELATE RESULTS
DEGREE OF FIT STRUCTURE CLASSIFICATION
DEGREE OF AGREEMENT BETWEEN ANALYSTS

APPENDIX G. FLOWCHART FOR COMPUTER PROGRAMS FOR THE PROJECT

G-1 LIST OF PROGRAMS IN OPERATIONAL ORDER

G-2 ANALYSIS OF 360 ONLINE SEARCHES - FLOWCHART 5

LIST OF COMPUTER PROGRAMS

BRIEF OUTLINE OF PROGRAMS IN OPERATIONAL ORDER

1.	STEP6	Selects data from original Dialog transcript
2.	STEP7	Separates selected data into commands used, time spent, and accession numbers retrieved by the searcher for each question searched
3.	STEP1	Creates and updates master lists of questions and searchers
4.	STEP2	1. Creates a list of searchers of each question 2. Sorts and merges accession numbers
5.	STEP3	Prepares merged accession number file to upload to Dialog
6.	STEP5	Prepares downloaded abstracts to send to the user for evaluation
7.	STEP4	Assigns relevance judgements to merged accession numbers
8.	STEP9	Assigns relevance judgements to individual searcher's accession number set
9.	STEP8	Adds offline time to online time
10.	STEP11	Selects search terms used
11.	STEP10	Prepares final data on each searcher
12.	STEP12	Prepares final data on each question

NSF PROJECT IST-8505411

EXPERIMENTS IN THE COGNITVE ASPECTS OF INFORMATION SEEKING AND INFORMATION RETRIEVING

PROGRAMS FOR ANALYSIS OF 360 ONLINE SEARCHES - FLOWCHART #5

Process the unedited search transcript file recorded on the hard disk for each searcher using STEP6

Deletes all but command lines and accession numbers

Print, edit and correct any typing and transmission errors

Process the edited search text, using STEP7

Creates separate files for the commands, the connect time and the accession numbers for each question and searcher

Print, edit and correct the accession numbers

Create file names for storing data for each question, using STEP1

Process the edited accession numbers, using STEP2

Creates sorted files of accession numbers
Sorts accession numbers by searchers
Merges accession numbers by question

Process the merged accession numbers for each question, using STEP3

Creates a file of accession numbers with commands to send to DIALOG

Send file of accession numbers to DIALOG to print abstracts

Process file of abstracts, downloaded on disk, using STEP5

Inserts a line at the end of each abstract for user to select appropriate relevancy statement

Send abstracts to users for evaluation

To Page 2 of program flowchart

PROGRAMS FOR ANALYSIS OF 360 ONLINE SEARCHES - FLOWCHART #5

From Page 1 of program flowchart

Evaluated abstracts received from users

Process file of abstracts evaluated by user, using STEP4

Shows each accession number and asks for user's evaluation of relevance

Creates a file of the user's evaluation of relevancy

Edit the relevancy statements for data entry errors, using STEP9

Creates a verified file of the relevancy statements

Process the connect time file, and enter offline search time, using STEP8

Creates a file of the online connect time, offline search preparation time and the total search time for each searcher

Process the relevancy statement files, the connect time file, and the command file, using STEP10

Creates the final data file for each searcher

Creates lists of the search terms used by each outside searcher, using STEP11

Creates the final data file for each question, using STEP12

APPENDIX H. FORMS USED FOR THE PROJECT (NUMBERED 1 THROUGH 16)

From Number	Title
1	"A Free Online Search!"
2	Searcher Profile (Preliminary)
3	Searcher Questionnaire (includes database and thesauri lists)
4	Instructions for Users
5	Question Request Form
6	Interview Notification
7	Interview Questionnaire
8	Context Questionnaire (User)
9	Interview Evaluation and Context Questionnaire (Project Searcher)
10	Context Questionnaire (Searcher)
11	Question Analysis
12	User Questionnaire on Evaluation of Answers
13	Search Record Form
14	Cover Letter to Users to Accompany Abstracts
15	User Questions for Online Searches
16	Search Term Overlap

APPENDIX H - FORMS

Form Number	Title
1	"A Free Online Search!"
2	Searcher Profile (Preliminary)
3	Searcher Questionnaire (includes database and thesauri lists)
4	Instructions for Users
5	Question Request Form
6	Interview Notification
7	Interview Questionnaire
8	Context Questionnaire (User)
9	Interview Evaluation and Context Questionnaire (Project Searcher)
10	Context Questionnaire (Searcher)
11	Question Analysis
12	User Questionnaire on Evaluation of Answers
13	Search Record Form
14	Cover Letter to Users to Accompany Abstracts
15	User Questions for Online Searches
16	Search Term Overlap

Form 1

CASE WESTERN RESERVE UNIVERSITY · CLEVELAND, OHIO 44106

A FREE ONLINE SEARCH!

DO YOU HAVE A QUESTION FOR SEARCHING?

DO YOU NEED A LITERATURE SEARCH OF COMPUTERIZED DATA BASES ON A TOPIC RELATED TO YOUR RESEARCH OR A PROBLEM YOU ARE WORKING ON?

We are looking for questions to search in connection with an NSF sponsored project investigating the processes in online searching and the performance of searchers.

We will conduct a very comprehensive search of your question and provide you with the answers (in the form of abstracts) FREE OF CHARGE.

As an information user we will ask you to:

1. Provide your question in a written form.
2. Participate in a short interview about the nature of the problem you are working on.
3. Fill out a very short questionnaire.
4. Indicate which answers were relevant to your question and if the search was satisfactory.

Your participation will provide you with a comprehensive free search. It will provide us with crucial data derived from real information needs and questions.

We hope that you will agree to participate in this research effort!

Please contact by phone or fill out the form below:

Tefko Saracevic, Principal Investigator
368-3610 or
Alice Chamis, Project Manager
368-3501

THANK YOU

TO: Alice Chamis, Ph.D
Matthew A. Baxter School of Information and Library Science, CWRU
Baker Building
Cleveland, Ohio 44106
I am willing to provide a request for searching!

Name:________________________ Phone:__________________
Department and address:

When is the best time to call you:

Form 2

EXPERIMENTS IN INFORMATION SEEKING AND RETRIEVING

SEARCHER PROFILE

Please complete the following questionnaire so that we can plan these experiments to use your expertise and to schedule you for online searching at your convenience.

Name ______________________________

Address ______________________________

____

Telephone B ______________ H ______________

When is the best time to call you? ______________

How frequently do you search Dialog? ______________

What is your subject expertise? ______________

What databases do you search most often? ______________

____

What thesauri do you have available? ______________

____

What type of terminal do you use for searching?

Computer terminal ______________________________

Microcomputer ______________________________

Number, by order of preference, the days you can search. Please indicate a.m. or p.m.

_____ Mon. _____ Tues. _____ Wed. _____ Thurs. _____ Fri. _____ Sat.

Comments:

If you have any questions, call Alice Chamis, Ph.D. at Case Western Reserve University, 368-3501.

Form 2a

EXPERIMENTS IN INFORMATION SEEKING AND RETRIEVING

SEARCHER PROFILE

Please complete the following questionnaire so that we can plan these experiments to use your expertise and to schedule you for online searching at your convenience.

Name ____

Address ____

____

Telephone B ____________________ H ____________________

When is the best time to call you? ____________________________

How frequently do you search Dialog? __________________________

What is your subject expertise? ______________________________

What databases do you search most often? ______________________

____

What thesauri do you have available? __________________________

____

What type of terminal do you use for searching?

Computer terminal ____________________________________

Microcomputer ______________________________________

Number, by order of preference, the days you can search. Please indicate a.m. or p.m.

_____ Mon. _____ Tues. _____ Wed. _____ Thurs. _____ Fri. _____ Sat.

Introductory meeting will be held Saturday, September 28, 1985 from 9:30 until noon, Hatch Auditorium, 1st floor Baker Building, Case Western Reserve University.

I can attend ________

I cannot attend _____ Alternate date: ______________________

Comments: (use back of sheet)

If you have any questions, call Alice Chamis, Ph.D. at Case Western Reserve University, 368-3501.

For Project Use Only
Searcher Number : : :
Question Number : : : : : :
: : : : : : : : : : : :
Form 3 (9/28/85)

NSF PROJECT

EXPERIMENTS ON COGNITIVE ASPECTS OF INFORMATION SEEKING AND INFORMATION RETRIEVING

Searcher Questionnaire

Soc Sec No. : : : : : : : : :

Last Name : : : : : : : : : : : : : : : : : : :
First Name : : : : : : : : : : :
Street Address :
City : : : : : : : : : : : : : : : : : : :
State : :
Zip : : : : :

Business phone: : : : : : : : : : : :
Home phone: : : : : : : : : : : : :

1. When can we best call you?

2. How often do you search DIALOG? (Please circle the best estimate.)

5 Daily 4 Twice a week 3 Once a week 2 Twice a month 1 Less

3. Refer to "List A - Selected Databases" (attached) and please indicate those databases that you search most often, in order of decreasing use. Below each database code indicate how often you search it, using the same codes as in Question 2 above.

Databases used most often

CODE: :

4. Frequency of use of the above databases.

: : : : : : :

5. Now please refer to "List B - Thesauri" (attached) and indicate those most important to you when you search.

CODE: T: : : : T: : : : T: : : : T: : : : T: : : : T : : : :

6. What are your preferred times for working on this project? Indicate order of preference, using codes listed below:

First, 2nd, 3rd, ...

: : : : : : :

		SUN	MON	TUE	WED	THU	FRI	SAT
AM:	9:00-12:00	A1	A2	A3	A4	A5	A6	A7
PM:	1:30- 4:30	P1	P2	P3	P4	P5	P6	P7
EVE:	5:30- 8:30	E1	E2	E3	E4	E5	E6	E7

LIST A - SELECTED DIALOG DATABASES

AGRICULTURE AND NUTRITION

010	AGRICOLA
005	BIOSIS
051	FOOD SCIENCE AND TECHNOLOGY ABSTRACTS

BUSINESS/ECONOMICS

557	MOODY'S CORPORATE NEWS--INTERNATIONAL
556	MOODY'S CORPORATE NEWS--U.S.
132	STANDARD & POOR'S NEWS

INDUSTRY SPECIFIC

168	INSURANCE ABSTRACTS
042	PHARMACEUTICAL NEWS INDEX

MARKET RESEARCH; INDUSTRY; MANAGEMENT

015	ABI/INFORM
139	ECONOMIC LITERATURE INDEX
122	HARVARD BUSINESS REVIEW
075	MANAGEMENT CONTENTS
018	PTS F & S INDEXES
016	PTS PROMPT
148	TRADE & INDUSTRY INDEX

STATISTICAL/DEMOGRAPHIC DATA

575	DONNELLY DEMOGRAPHICS

CHEMISTRY

138	CHEMICAL EXPOSURE
174	CHEMICAL REGULATIONS AND GUIDELINES SYSTEM
240	PAPERCHEM

COMPUTER SCIENCE

256	BUSINESS SOFTWARE DATABASE
008	COMPENDEX
275	COMPUTER DATABASE
013	INSPEC
232	.MENU--THE INTERNATIONAL SOFTWARE DATABASE
233	MICROCOMPUTER INDEX

LIST A - SELECTED DIALOG DATABASES (Continued)

CURRENT AFFAIRS

259	AP NEWS
047	MAGAZINE INDEX
111	NATIONAL NEWSPAPER INDEX
049	PAIS INTERNATIONAL
132	STANDARD AND POOR'S NEWS
260	UPI NEWS
184	WASHINGTON POST INDEX
167	WORLD AFFAIRS REPORT

EDUCATION

001	ERIC
054	EXCEPTIONAL CHILD EDUCATION RESOURCES

ENERGY AND ENVIRONMENT

112	AQUACULTURE
005	BIOSIS
069	ENERGYLINE
040	ENVIRONLINE
041	POLLUTION ABSTRACTS

LAW AND GOVERNMENT

102	ASI
101	CIS
174	CHEMICAL REGULATIONS AND GUIDELINES
135	CONGRESSIONAL RECORD ABSTRACTS
171	CRIMINAL JUSTICE PERIODICAL INDEX
020	FEDERAL INDEX
136	FEDERAL REGISTER ABSTRACTS
244	LABORLAW
150	LEGAL RESOURCES INDEX
021	NCJRS
006	NTIS

MATERIALS SCIENCE

032	METADEX
118	NONFERROUS METALS ABSTRACTS
240	PAPERCHEM
033	WORLD ALUMINUM ABSTRACTS

LIST A - SELECTED DIALOG DATABASES (Continued)

MEDICINE

005	BIOSIS
138	CHEMICAL EXPOSURE
074	INTERNATIONAL PHARMACEUTICAL ABSTRACTS
076	LIFE SCIENCES COLLECTION
154	MEDLINE
086	MENTAL HEALTH ABSTRACTS
218	NURSING AND ALLIED HEALTH (CINAHL)
161	OCCUPATIONAL SAFETY AND HEALTH (NIOSH)
042	PHARMACEUTICAL NEWS INDEX
238	TELEGEN
185	ZOOLOGICAL RECORD

SCIENCE AND TECHNOLOGY

008	COMPENDEX
089	GEOREF
013	INSPEC
014	ISMEC
006	NTIS
119	TEXTILE TECHNOLOGY DIGEST
067	WORLD TEXTILES

SOCIAL SCIENCES AND HUMANITIES

038	AMERICA: HISTORY AND LIFE
056	ARTBIBLIOGRAPHIES MODERN
064	CHILD ABUSE AND NEGLECT
291	FAMILY RESOURCES
039	HISTORICAL ABSTRACTS
036	LANGUAGE AND LANGUAGE BEHAVIOR ABSTRACTS
071	MLA BIBLIOGRAPHY
049	PAIS INTERNATIONAL
011	PsychINFO
097	RILM ABSTRACTS
037	SOCIOLOGICAL ABSTRACTS
167	WORLD AFFAIRS REPORT

LIST B - THESAURI

AGRICULTURE AND NUTRITION

T010	Agricultural Terms
T005	BIOSIS Search Guide
T051	FSTA Thesaurus

INDUSTRY SPECIFIC

T168	Thesaurus (INSURANCE ABSTRACTS)

MARKETING RESEARCH; INDUSTRY; MANAGEMENT

T015	Search INFORM
T122	HBR/Online Thesaurus
T075	MANAGEMENT CONTENTS Database Thesaurus and Indexers Manual and Dictionary
T018	PTS Users Manual
T148	Subject Guide to IAC Databases

CHEMISTRY

T174	CRGS Thesaurus
T240	Keyword Frequency List (PAPERCHEM)

COMPUTER SCIENCE

T256	Search SOFTWARE.
T008	SHE: Subject Headings for Engineering
T275	The Computer Database Thesaurus and Dictionary
T013	INSPEC Thesaurus
T233	MicroTips. A User's Guide to Microcomputer Index on DIALOG

EDUCATION

T001	Thesaurus of ERIC Descriptors

ENERGY AND ENVIRONMENT

T112	Aquaculture Thesaurus
T005	BIOSIS Search Guide
T041	POLLUTION ABSTRACTS Thesaurus

LIST B - THESAURI (Continued)

LAW AND GOVERNMENT

T101	CIS Online Users Guide and Thesaurus of Index Terms
T174	CRGS Thesaurus
T171	Thesaurus (CRIMINAL JUSTICE PERIODICAL INDEX)
T021	National Criminal Justice Thesaurus
T006	COSATI Subject Category List

MATERIALS SCIENCE

T032	Thesaurus of Metallurgical Terms
T240	Thesaurus of Pulp and Paper Terms
T033	Thesaurus of Aluminum Technology

MEDICINE

T005	BIOSIS Search Guide
T074	Thesaurus of Subject Terms (IPA)
T076	Thesaurus—LIFE SCIENCES COLLECTION
T154	Medical Subject Headings
T086	MENTAL HEALTH ABSTRACTS Users Guide
T218	CINAHL Subject Headings
T238	Teleginline User´s Manual

SCIENCE AND TECHNOLOGY

T008	SHE: Subject Headings for Engineering
T089	GeoRef Thesaurus and Guide to Indexing
T013	INSPEC Thesaurus
T014	ISMEC Thesaurus
T006	COSATI Subject Category List
T119	Textile Technology Digest—Keyterms
T067	Register of Keyterms (WORLD TEXTILES)

SOCIAL SCIENCE AND HUMANITIES

T064	Child Abuse and Neglect Thesaurus
T036	LLBA User´s Manual
T049	PAIS Subject Headings List
T011	Thesaurus of Psychological Index Terms
T097	RILM English-Language Thesaurus
T037	SOCIOLOGICAL ABSTRACTS User´s Manual

For Project Use Only

Interview Date/Time ____________________

Location ______________________________

Interviewer ________ Notified ________

Question No. 0 : : : :

Searchers : : : : : : : : :

: : : : : : : : :

Form 4 (10/1/85)

NSF PROJECT IST-850 5411
EXPERIMENTS ON THE COGNITIVE ASPECTS OF INFORMATION SEEKING AND INFORMATION RETRIEVING

NSF Project Summary

This project will study the effects of a variety of factors on the effectiveness and efficiency of online searches performed on a variety of questions. The objective of this project is to conduct a series of experiments on the A) context of requests in information retrieval B) structure and classification of requests C) procedures in request analysis and search strategy, and, D) characteristics and behavior of intermediary searchers.

INSTRUCTIONS FOR USERS

Thank you for expressing an interest in submitting a question to this NSF Project, which will provide you with a free online database search for your question.

1. Please complete the form below and the attached "Question Request Form" so that we can conduct your literature search and schedule you for a follow-up interview.

: : : : : : : : : : : : : : : Last Name

: : : : : : : : : First Name

: Street

: : : : : : : : : : : : : : : City

: : State

: : : : : Zip

Telephone : : : : : : : : : : : Business

: : : : : : : : : : : : : : : Home

CWRU Campus Address:

: : : : : : : : : : : Department

: : : : : : : : : : : Building

: : : Room

Campus Ext. : : : :

2. When is the best time to call you? ______________________________

3. Please indicate below a specific time or times during the week of

________________________________ (9 a.m. - 4:30 p.m.)

when you could be available for an interview.

____

(We will call you to confirm a specific time and place.)

4. The NSF Project Office is located in Baker Building, Room 318, CWRU. Interviews can be held there or at your office. Please indicate your preference.

Baker, Room 318 ______ Your office, Bldg. ____________________ Room______

5. The interview concerning your question will be taped for the use of the project only. Please sign below to confirm that you agree to having this search interview taped and that you will provide a determination of the relevance of each of the abstracts, obtained from the search, within two weeks of the receipt of the abstracts.

Signature ______________________________________ Date ____________________

The Project Office reserves the right to maintain copies of all searches. All information obtained for this project will be treated confidentially and all copies maintained will be held confidentially in terms of the person who requested the search. If you have further questions, please call us at 216/368-3501.

Alice Y. Chamis, Ph.D.
Project Manager
Tefko Saracevic, Ph.D.
Principal Investigator

For Project Use Only
Question No. Q: : : :
Searchers : : : : : : : : :
: : : : : : : : :
Database : : : : : :
Form 5 (10/1/85)

NSF PROJECT IST-850 5411
EXPERIMENTS ON THE COGNITIVE ASPECTS OF INFORMATION
SEEKING AND INFORMATION RETRIEVING

QUESTION REQUEST FORM

A. Please state your question below as clearly and specifically as possible. This statement of your question will be the only information made available to most of the searchers of the online databases who will conduct your literature search. Define any words which have special meaning for your question.

1. Brief title: ______________________________

2. Question statement:

(If necessary, use the back of the page.)

For each question below circle the number which corresponds to a description of the type of search you want.

B. Do you want a precise or a broad search?

3 A precise search produces a relatively small set of abstracts each of which is likely to be relevant.

4 A broad search produces a relatively large set of abstracts with a better chance of containing all relevant abstracts in the database.

C. Type of application of this research:

5 Undergraduate study

6 Graduate study

7 Faculty research

8 Industrial

9 General

10 Other ____________________________
(Please specify)

D. Do you want to place restrictions on the language of publication of the articles retrieved?

11 English only

12 Any language

E. Do you want to restrict the years of publication of the articles retrieved?

13 Last 5 years

14 No limits

15 Other, specify 19____ to 19____

F. If you are familiar with the DIALOG databases, please indicate those that would be appropriate for your question.

16 ____

17 ____

18 ____

RE: NSF Project "Experiments on the Cognitive Aspects of Information Seeking and Information Retrieving"

We have received your question and would like to interview you further about your research. The interview itself will not take longer than a half hour. As per the times you preferred, we would like to schedule your interview for: ____

Please call us at 368-3501 any time between 9 a.m. and 5 p.m., Mon. through Fri, if you cannot come at this time. We will be glad to reschedule you for a time that is convenient.

We appreciate your participation!

Donna Trivison
Research Assistant
Alice Y. Chamis, Ph.D.
Project Manager
Tefko Saracevic, Ph.D.
Principal Investigator

Form 6 (10/14/85)
file:test

Interview:

Date/Time_____________

Location______________

Interviewer___________

For Project Use Only

Question No. __:__:__:

Project Searcher No. __:__:__:
Form 7 (10/14/85)

INTERVIEW QUESTIONNAIRE

Purpose:
Your question will be searched by several searchers based on the written question which you have submitted. The purpose of this interview is to tell us about the problem that motivated your question. The information will be used to design an additional search for your question.

1. Could you describe, in about 5 minutes, the problem which motivated your research question.

2. In your opinion and on a scale of from 1 to 5, would you describe your problem as weakly defined or clearly defined, with 1 being weakly defined and 5 being clearly defined.

:___________:___________:___________:___________:___________:
1 2 3 4 5

Weakly Defined Clearly Defined

PROBLEM DEFINITION SCALE

3. How do you expect to use the information obtained? (e.g., dissertation/thesis, project research, writing a proposal, administrative planning, professional awareness, review article/book, curriculum development, classroom material)

4. On a scale of from 1 to 5, would you say that your use of this information will be open to many avenues, or, for a specifically defined purpose, with 1 representing open to many avenues and 5 representing a specifically defined purpose.

:___________:___________:___________:___________:___________:
1 2 3 4 5

Open to Many
Avenues

Purpose is Narrowly
Defined

INTENT SCALE

5. Give the user the written "Context Questionnaire".

For Project Use Only

Question No. __:__:__:

Project Searcher No. __:__:__:
Form 8 (10/15/85)

CONTEXT QUESTIONNAIRE
(USER)

1. On a scale of 1 to 5, how would you rank the probability that information about the problem which motivated this research question may be found in the literature.

:___________:___________:___________:___________:___________:
1 2 3 4 5

Highly Improbable
That It Exists

Highly Probable
That It Exists

( ) I don't know.

PROBLEM-PUBLIC KNOWLEDGE SCALE

2. On a scale of 1 to 5, how would you rank the amount of knowledge you possess in relation to the problem which motivated this request.

:___________:___________:___________:___________:___________:
1 2 3 4 5

Little Personal
Knowledge

Considerable Personal
Knowledge

INTERNAL KNOWLEDGE SCALE

Interview:
Date/Time______________
Location______________
Interviewer____________

Question No. __:__:__:
Project Searcher No. __:__:__:
Form 9 (11/13/85)

INTERVIEW EVALUATION AND CONTEXT QUESTIONNAIRE
(PROJECT SEARCHER)

1. In your opinion and on a scale of from 1 to 5, would you describe the user's problem, as discernible from the interview, as weakly defined or clearly defined, with 1 being weakly defined and 5 being clearly defined.

:___________:___________:___________:___________:___________:

1	2	3	4	5
Weakly Defined				Clearly Defined

PROBLEM DEFINITION SCALE

2. On a scale of from 1 to 5, would you say that the use of this information by this user will be open to many avenues, or, for a specifically defined purpose, with 1 representing open to many avenues and 5 representing a specifically defined purpose.

:___________:___________:___________:___________:___________:

1	2	3	4	5
Open to Many Avenues				Purpose is Narrowly Defined

INTENT SCALE

3. On a scale of 1 to 5, how would you, as a project searcher, rank the probability that information about the problem which motivated this research question may be found in the literature.

:___________:___________:___________:___________:___________:

1	2	3	4	5
Highly Improbable That It Exists				Highly Probable That It Exists

( ) I don't know.

PROBLEM-PUBLIC KNOWLEDGE SCALE

4. On a scale of 1 to 5, how would you, as a project searcher, rank the amount of knowledge you possess in relation to the problem which motivated this request.

:___________:___________:___________:___________:___________:

1	2	3	4	5
Little Personal Knowledge				Considerable Personal Knowledge

INTERNAL KNOWLEDGE SCALE

For Project Use Only

Question No. __:__:__:

Project Searcher No. __:__:__:
Form 10 (10/15/85)

CONTEXT QUESTIONNAIRE
(SEARCHER)

1. On a scale of 1 to 5, how would you rank the probability that information about the problem which motivated this research question may be found in the literature.

:___________:___________:___________:___________:___________:
1 2 3 4 5

Highly Improbable That It Exists — Highly Probable That It Exists

( ) I don't know.

PROBLEM-PUBLIC KNOWLEDGE SCALE

2. On a scale of 1 to 5, how would you rank the amount of knowledge you possess in relation to the problem which motivated this request.

:___________:___________:___________:___________:___________:
1 2 3 4 5

Little Personal Knowledge — Considerable Personal Knowledge

INTERNAL KNOWLEDGE SCALE

QUESTION ANALYSIS Form 11(5/9/86)file: qaf

QUESTION NUMBER__________________________

ANALYSIS FOR STRUCTURE

____
(LEAD-IN)(MODIFIERS)(QUERIES)(MODIFIERS)(SUBJECTS)(CONSTRAINTS)

____

____

____

____

Domain: Number of (Dialindex) Categories _______________

Clarity: 1. Semantics (meaning of terms)
[ ] [ ] [ ] [ ] [ ]
1 2 3 4 5

2. Syntax (relation between terms)
[ ] [ ] [ ] [ ] [ ]
1 2 3 4 5

Clarity Score: ________ + ________ / 2 = ________
1. 2.

Specificity:
query 1: [ ] [ ] [ ] [ ] [ ]
meta 1 2 3 4 5 object

query 2: [ ] [ ] [ ] [ ] [ ]
meta 1 2 3 4 5 object

query 3: [ ] [ ] [ ] [ ] [ ]
meta 1 2 3 4 5 object

Query Mean _________

subject 1: [ ] [ ] [ ] [ ] [ ]
meta 1 2 3 4 5 object

subject 2: [ ] [ ] [ ] [ ] [ ]
meta 1 2 3 4 5 object

subject 3: [ ] [ ] [ ] [ ] [ ]
meta 1 2 3 4 5

Subject Mean _________

Specificity Score: _________ + _____________ / 2 = _____________
Query Mean Subject Mean

Complexity: Number of Search Concepts _____________

Number of Constraints _____________

Presuppositions: Number/Percent transferable to search process _____________

Final Summary Score: _____________

User Name __________________________ Question No. __:__:__:

Date _______________________ Number of Abstracts _____________
Form 12 (1/2/86) file:abstracts

USER QUESTIONNAIRE ON EVALUATION OF ANSWERS

1. How much time did you spend reviewing these abstracts? ___________________

2. In an overall sense, if you were asked to assign a dollar value to the usefulness of this entire set of abstracts to you, what would that dollar value be? $ ___________ _____ I cannot assign a dollar value.

3. Could you rate your participation in this project and the information that has resulted from it as:

5 Worth much more than the time it has taken
4 Worth somewhat more than the time it has taken
3 Worth about as much as the time it has taken
2 Worth less than the time it has taken
1 Practically worthless

4. PROBLEM RESOLUTION SCALE - On a scale of 1 to 5, what contribution has this information made to the resolution of the problem that motivated your question?

:_______:_______:_______:_______:_______:
1 2 3 4 5

nothing contributed substantial contribution

5. SATISFACTION SCALE - On a scale of 1 to 5, how satisfied were you with the results of the search?

:_______:_______:_______:_______:_______:
1 2 3 4 5

dissatisfied satisfied

6. Do you have any general comments about any part of the project, including the questionnaires, the interview, or the results? (Use the back of the page if necessary.)

Thank you for your cooperation and help.

Question No. __:__:__:

Search Order 1 2 3 4 5 6

Searcher No. __:__:__:
Form 13 (11/4/85)
file: searchrecord

SEARCH RECORD FORM

Database to be searched:

Thesauri used:

Preliminary search strategies:

Date __________________

Total offline time spent preparing this search ____________________________

(Use additional forms, if needed)

NSF Project IST-8505411
"Experiments in the Cognitive Aspects of Information
Seeking and Information Retrieving"

User Name ______________________________ Question No. __:__:__:
Date __________________ Abstracts Enclosed ____________

First of all, thank you for your willingness to participate in the experiments dealing with online searching.

Your question was searched by several searchers in the database, ____.
The enclosed set of abstracts represents the combined answers retrieved by all searchers.

We have provided you with a duplicate set of abstracts. Keep the duplicate for your use. Please indicate your relevance judgements on the originals and return them to the Project Office in the enclosed envelope.

Each abstract should be evaluated according to the degree of its relevance to the question you submitted for searching. A copy of your question is attached. The degree of relevance is to be determined using the following three point scale:

RELEVANT - Any document which on the basis of the information it conveys is considered to be related to your question, even if the information is outdated or already familiar to you.

PARTIALLY RELEVANT - Any document which on the basis of the information it conveys is considered only somewhat or in some part related to your question or to any part of your question.

NONRELEVANT - Any document which on the basis of the information it conveys is not at all related to your question.

After you have evaluated each document, please complete the enclosed "User Questionnaire on Evaluation of Answers." Return it with the abstracts.

Your evaluation will provide the data necessary for the completion of our study of the factors which affect online searching.

Please call our office, 368-3501, if you have any questions about the evaluation. Your cooperation, as in the past, is greatly appreciated.

Sincerely,

Alice Y. Chamis

Alice Y. Chamis, Ph.D.
NSF Project Director

Return to: Alice Y. Chamis, Ph.D.
Baker Building, Room 318
Case Western Reserve University
Cleveland, OH 44106

Please return by _______________

Enclosures

Form14(1/2/86)file:answers

Form 15 (3/31/86)

NSF PROJECT IST-850 5411
EXPERIMENTS ON THE COGNITIVE ASPECTS OF INFORMATION SEEKING AND INFORMATION RETRIEVING

USER QUESTIONS FOR ONLINE SEARCHES

QUESTION NUMBER:
DIALOG DATABASE USED:
SEARCHER CODE NUMBERS:

A1. BRIEF TITLE:

A2. QUESTION STATEMENT:

TYPE OF SEARCH REQUESTED

B. A precise or a broad search:
C. Research application:
D. Retrieve articles in English only or any language:
E. Years to be searched:
F. DIALOG databases suggested:

SEARCH TERM OVERLAP

NAME ________________________

TODAY'S DATE ______________

TIME SPENT ________________

Question Number -- -- -- -- -- --

Searcher Number	Search Term Overlap with Searcher (Itemized)			
	-- -- --	-- -- --	-- -- --	-- -- --
-- -- --	______ ______	______ ______	______ ______	______ ______
-- -- --	▨	______ ______	______ ______	______ ______
-- -- --	▨	▨	______ ______	______ ______
-- -- --	▨	▨	▨	______ ______

Searcher Number	Number of Search Terms Used	Search Term Overlap with Searcher (Total Number)			
		-- -- --	-- -- --	-- -- --	-- -- --
-- -- --	------				
-- -- --	------	▨			
-- -- --	------	▨	▨		
-- -- --	------	▨	▨	▨	
-- -- --	------				

Form 16
(4/21/86)file:overlap

APPENDIX I. PROCEDURES USED FOR THE PROJECT (NUMBERED 1 THROUGH 12)

Procedure Number	Title
1	Procedures for Receiving the Written Question Statements
2	Guide for Interview of User by Searcher
3	Searcher Instructions
4	Procedures for DIALOG Searching
5	Procedures for Recording Searches from Hard Disk onto Diskette
6	Procedure for DIALOG Searching Using the Compaq
7	Procedures for Loading the Compaq Searches from Diskette onto IBM/XT Hard Drive
8	Procedures for Project Searches
9	Procedure for Determining Search Term Overlap
10	Procedures for Completing Question Request Forms Using the IBM/XT Computer
11	Procedures for Using the Dbase Files on the Compaq Computer
12	Procedures for Using Pascal Programs - Data Processing Report

Procedure No. 1
(10/16/85)

Procedures for Receiving Written Question Statements

1. Assign question a number from the master list of questions received. Write question number on each page of question form.

2. Set up a folder for each question using the question number as the title of the folder.

3. Make copies for: data processing (1 copy) - give to Jeong

   interview (1 copy)
   searchers (5 copies, pp. 3 & 4 only) -- put all of these copies in folder

4. Set up interview:
   a. assign to interviewer
   b. decide on time and place
   c. notify user
   d. record on calendar

5. Prepare interview forms listing date/time and question number. Put these forms in the question folder.

4. Assign question to searcher.

Procedure No. 2
(10/14/85) file:interview

GUIDE FOR INTERVIEW OF USER BY SEARCHER

1. Contact the user at least one week ahead of time to schedule an interview. Determine the date, time and place for the interview.

2. Contact the user the day before the interview to confirm the scheduled interview.

3. Before going to the interview, record on the tape recorder the question number, your searcher number, the date and time of the scheduled interview.

4. Take to interview: 1) copy of the user's question request forms (all 4 pages) 2) an "Interview Questionnaire," and 3) a "Context Questionnaire".

5. Start the interivew in a friendly manner and describe the procedures for the interview, the taping, the search and evaluation of the results.

6. Explain that the purpose of the interview is to obtain additional information about the question for additional searches of the question.

7. Ask the user the questions noted on the "Interview Questionnaire." Do not use any additional prompt beyond the question.

8. Give user the written "Context Questionnaire" to fill out.

8. Thank the user for his or her time and inform him or her that he or she will receive the abstracts for relevance evaluation within three weeks. One set of the abstracts should be marked for relevance, using the scale provided, and returned to the Project Office within 2 weeks. A second copy of the abstracts are for the user to keep.

Alice Y. Chamis, Ph.D.
Project Manager

Procedures No. 3
(11/4/85)
file: instruct

NSF Project
SEARCHER INSTRUCTIONS
(Preliminaries)

1. You have been assigned 5 or 6 questions to search on Dialog using the databases available on the Classroom Instruction Program.

2. Read each question as described by the user on his or her Question Request Form. Each question should be searched in the order and database specified on the Search Record Form supplied to you for that question.

3. After reading all of the assigned questions, examine the thesauri available in the NSF Project Office to determine the search vocabulary needed. Note on the Search Record Forms the thesauri used.

4. Before going online, formulate the search strategies for each question which will provide the best retrieval. Record these preliminary search strategies on the Search Record Forms. Use as many forms as needed.

5. Underline (or highlight) the terms you don't understand in each question.

6. You should now be ready to conduct your searches online. Instructions for online searching are written on the next page.

DIALOG TIPS

1. To get English articles when LA=ENGLISH is not available, use NOT LA=NONENGLISH.

Procedures No. 4
(11/7/85)
file: sinstruct

PROCEDURES FOR DIALOG SEARCHING

1. Turn on computer with disk drive open.

2. When the display appears on the screen, enter new date and new time (if the time is p.m. use military time, e.g. 14:00) with a carriage return after each entry. The Main Menu display will now appear along with a C> prompt.

3. Turn on the printer and make sure that it is set for online (the top-front toggle switch must be pushed up so that both red lights are on). Please note, if at any time the printer does not respond, push the toggle switch to online.

4. At the C> prompt, enter "project" and a carriage return. Entering "project" selects SMARTCOM II and the system will respond with a welcome message and instruct you to strike any key when ready. You should enter a carraige return. The system will respond with an F> prompt.

5. At the F> prompt, enter "scom" and a carriage return.

6. Now enter a 7 without a carriage return to change the printer status to (ON).

7. Next enter 1 (begin communication). Do not use a carriage return.

8. Then enter an 0 (originate). Do not use a carriage return.

9. Next select a communication network in the following order of preference (choose either Dialog 1 or 2, whichever you use most frequently):

	Dialog 1	Dialog 2	
DIALNET	M	Q	with carriage return
TELENET	J	N	w/o carriage return
TYMNET	K	O	w/o carriage return
UNINET		P	w/o carriage return

10. Enter the DIALOG password provided for your use in the project.

11. Hit the F1 key. (The F1 key is in the top left hand corner of the keyboard.)

12. Next enter a 4 (receive file). Do not use a carriage return.

13. Next enter a 2 (stop/start) Do not use a carriage return.

14. The computer will now ask for a file name. The display looks like this: _______ You should enter your searcher number. For example if your searcher number is 19, you would enter 019 and a carriage return.

15. Next begin the file as assigned with a b file number command. For example, if you are searching ABI/INFORM, the command is b15.

16. At the first Dialog prompt ?, enter an * and the number of the question you are currently searching. For example, *Q001. (Ignore any invalid code messages that will result in Dialog 1.)

17. Search using the strategies you formulated offline. Type as many of the citations as you need to refine your search strategy. When the desired end result set is obtained, TYPE the set out in FORMAT 1 (accession number only). Your results will be combined later with those of other searchers and abstracts will be printed out for the combined results. For example, to type out set number 3 with 20 documents in format 1, the command would be t3/1/1-20 if you are using Dialog 1 and t3/1/all if you are using Dialog 2.

18. If during the searching, you are disconnected from Dialog and find yourself back at the "scom" menu, repeat steps 11 through 13. At step 14, reenter your searcher number for the file name. You will see the following selections on the screen: File exists R(e-enter), E(rase), A(ppend). You should select A for append. Proceed to step 15, etc.

19. Use the LOGOFF HOLD command if you need to stop your search temporarily.

20. To begin searching the next question, use a new b command even if the next question is to be searched in the same database as the previous question.

21. At the first new Dialog prompt ?, enter the new question number, for example *Q002.

22. When all assigned questions are searched, LOGOFF.

23. Hit the F1 key.

24. Enter 0 (end communication).

25. Enter Y (yes). This is the last step. DO NOT TURN OFF THE COMPUTER.

26. Attach the printout of your search results to the Question Request Forms and the Search Record Forms and return them to the Project Office.

27. The check for the total time spent searching and taking the tests will be sent to you later.

Procedure 5
(11/26/85)
file:record

Procedures for Recording Searches from Hard Drive onto Diskette

1. If the computer is off, turn it on with the disk drive open. When the display appears on the screen, enter the new date and time as prompted. Use a carriage return after each entry. If you have a C> prompt, enter "project". You will now be at an F> prompt.

2. If the computer has been left on, you should have an F> prompt.

3. At the F> prompt, enter "format A:/V" and a carriage return.

4. Insert an unformatted floppy disk into drive A and follow the prompt to strike enter. The system will respond with the message formatting... Wait until the system completes formatting and gives you the next prompt for a volume label.

5. For volume label, enter "S _ _ _" using the number of the searcher who conducted the search. For example, S019. Use a carriage return.

6. The system will ask if you are formatting another. Respond with Y (es) or N (no). Use a carriage return.

7. At the F> prompt, type "dir" and a carriage return to check for the presence of the searcher's file on the hard disk.

8. At the next F> prompt, enter the following command for the first file to be copied: copy _ _ _ A: Use a carriage return.

9. At the next F> prompt, enter copy _ _ _ G: with a carriage return.

10. After the first file is copied onto both the floppy and the G sector of the hard disk, repeat for any additional files to be copied.

11. After the last file is copied, turn off the computer.

Procedures No. 6
(12/05/85)
file: sinstruct

PROCEDURES FOR DIALOG SEARCHING USING COMPAQ

1. Turn on computer with DOS 2.0 diskette in disk drive A.

2. When the display appears on the screen, enter new date and new time (if the time is p.m. use military time, e.g. 14:00) with a carriage return after each entry.

3. Replace the DOS 2.0 diskette in drive A with SMARTCOM diskette.

4. Insert the data diskette provided into drive B.

5. Turn on the printer and make sure that it is set for online (the top-front toggle switch must be pushed up so that both red lights are on). Please note, if at any time the printer does not respond, push the toggle switch to online.

6. At the A> prompt, enter "project" and a carriage return. Entering "project" selects SMARTCOM II and the system will respond with a welcome message and instruct you to strike any key when ready. You should enter a carraige return.

7. At the next A> prompt, enter "scom" and a carriage return. You will now be at the SMARTCOM menu.

8. Enter a B without a carriage return (to select drive B).

9. Now enter a 7 without a carriage return to change the printer status to (ON).

10. Next enter 1 (begin communication). Do not use a carriage return.

11. Then enter an O (originate). Do not use a carriage return.

12. Next select a communication network in the following order of preference (choose either Dialog 1 or 2, whichever you use most frequently):

	Dialog 1	Dialog 2	
DIALNET	M	Q	with carriage return
TELENET	J	N	w/o carriage return
TYMNET	K	O	w/o carriage return
UNINET		P	w/o carriage return

13. Enter the DIALOG password provided for your use in the project.

14. Hit the F1 key. (The F1 key is in the top left hand corner of the keyboard.)

15. Next enter a 4 (receive file). Do not use a carriage return.

16. Next enter a 2 (stop/start) Do not use a carriage return.

17. The computer will now ask for a file name. The display looks like this: _______ You should enter your searcher number. For example if your searcher number is 19, you would enter 019 and a carriage return.

18. Next begin the file as assigned with a b file number command. For example, if you are searching ABI/INFORM, the command is b15.

19. At the first Dialog prompt ?, enter an * and the number of the question you are currently searching. For example, *Q001. (Ignore any invalid code messages that will result in Dialog 1.)

20. Search using the strategies you formulated offline. Type as many of the citations as you need to refine your search strategy. When the desired end result set is obtained, TYPE the set out in FORMAT 1 (accession number only). Your results will be combined later with those of other searchers and abstracts will be printed out for the combined results. For example, to type out set number 3 with 20 documents in format 1, the command would be t3/1/1-2222
0
if you are using Dialog 1 and t3/1/all if you are using Dialog 2.

21. If during the searching, you are disconnected from Dialog and find yourself back at the "scom" menu, repeat steps 11 through 13. At step 14, reenter your searcher number for the file name. You will see the following selections on the screen: File exists R(e-enter), E(rase), A(ppend). You should select A for append. Proceed to step 15, etc.

~~22. Use the LOGOFF HOLD command if you need to stop your search temporarily~~.

23. To begin searching the next question, use a new b command even if the next question is to be searched in the same database as the previous question.

24. At the first new Dialog prompt ?, enter the new question number, for example *Q002.

25. When all assigned questions are searched, LOGOFF.

26. Hit the F1 key.

27. Enter 0 (end communication).

28. Enter Y (yes). This is the last step. DO NOT TURN OFF THE COMPUTER.

29. Attach the printout of your search results to the Question Request Forms and the Search Record Forms and return them to the Project Office.

30. The check for the total time spent searching and taking the tests will be sent to you later.

Procedure No. 7
(12/05/85)
file:record

Procedures for Loading COMPAQ Searches from Diskette onto IBM/XT Hard Drive and to Create Search Diskette

1. If the computer is off, turn it on with the disk drive open. When the display appears on the screen, enter the new date and time as prompted. Use a carriage return after each entry. If you have a C> prompt, enter "project". You will now be at an F> prompt.

2. If the computer has been left on, you should have an F> prompt.

3. At the F> prompt, enter "format A:/V" and a carriage return.

4. Insert an unformatted floppy disk into drive A and follow the prompt to strike enter. The system will respond with the message formatting... Wait until the system completes formatting and gives you the next prompt for a volume label.

5. For volume label, enter "S _ _ _" using the number of the searcher who conducted the search. For example, S019. Use a carriage return.

6. The system will ask if you are formatting another. Respond with Y (es) or N (no). Use a carriage return.

7. Insert data diskette produced on the COMPAQ into drive A of IBM/XT.

8. At the F> prompt, enter: copy A: _ _ _ G:

9. Remove the COMPAQ data diskette from drive A and replace it with the new, formatted diskette.

10. At the F> prompt, enter: copy G: _ _ _ A:

11. After the last file is copied, turn off the computer.

Procedure No. 8
(12/05/85)
file:sproject

Procedures for Project Searches

INTRODUCTION

A project staff member will conduct four project searches for each question. A staff member other than the person who conducted the taped interview will conduct these four searches. Procedures for these four searches are described below.

1. Project Search #1 (Series #1) - Search of Problem Statement

Listen to the taped interview of the problem statement. Complete the context questionnaire (Form 9). Do not look at either the written question statement (Form 5) or the user's context questionnaire (Form 8).

Use Form 13 to record the search strategy you formulate offline. Record the time spent on the bottom of the form. At the top of Form 13 where it asks for your searcher number, use your number preceded by a "1" (for example, 120).

Conduct the search online using Procedure No. 4. When naming the file to receive the data, use your searcher number preceded by a "1" (for example, searcher number 20 would use 120).

2. Project Search #2 (Series #2) - Search of Problem Statement with Written Question Statement

Read the written question statement and, if needed, listen to the taped interview again. Using a new copy of Form 13, formulate a search strategy offline for the question based on the information contained in both the written question and the interview. Be sure to note the amount of offline time spent on the formulation. On Form 13 where it asks for your project searcher number, this time use your number preceded by a "2" (for example, 220).

Context questionnaires will not be used for this or either of the remaining two searches.

3. Project Search #3 (Series #3) - Search of Written Question Words

Construct a search strategy based only on the words appearing in the written question statement (Form 5). Again, use a copy of Form 13 to record this strategy and the time spent preparing it. Your searcher number for this search should be preceded by a "3" (for example, 320).

4. Project Search #4 (Series #4) - Search of Written Question Words Augmented by Thesaurus Terminology

Starting with the words appearing in the written question statement which you selected for use in Project Search #3, use the appropriate thesaurus to find related terminology. Use the thesaurus for the assigned database. If there is no print thesaurus, use the online thesaurus if available.

Record your search strategy on a new copy of Form 13. For searcher number use your number preceded by a "4" (for example, 420).

5. Conduct the online search of Project Searches #2, #3, #4. Use the procedures outlined in Procedures No. 4. Create a new file for each of these searches. For Search #2, name the file 2 _ _
" " #3, " " " 3 _ _
" " #4, " " " 4 _ _
Fill in the blanks with your project searcher number.

Procedure No. 9
(4/21/86)
file: proc9

PROCEDURE FOR DETERMINING SEARCH TERM OVERLAP

1. Start with the 5 listings of the search terms used by each searcher for the question to be analyzed.

EXAMPLE: The listings for question 001 searched in database 011 by searchers 002, 005, 013, 016, and 021 would include:

D001011.002
D001011.005
D001011.013
D001011.016
D001011.021

2. Fill in the Search Term Overlap Form with your name, today's date and the question number and searcher numbers. Note the time. (When you are finished fill in the total time you spent on that question.)

EXAMPLE: For the listings D001011.002, D001011.005, D001011.013, D001011.016, and D001011.021, the question number is 001011 and the searcher numbers are 002, 005, 013, 016, and 021.

The form should be filled in like this: (see next page)

SEARCH TERM OVERLAP

NAME ________________________

TODAY'S DATE ______________

TIME SPENT ________________

Question Number 0 0 1 0 1 1

Search Term Overlap with Searcher (Itemized)

Searcher Number	005	013	016	021
002				
005	▨			
013	▨	▨		
016	▨	▨	▨	

Search Term Overlap with Searcher (Total Number)

Searcher Number	Number of Search Terms Used	005	013	016	021
002	------				
005	------	▨			
013	------	▨	▨		
016	------	▨	▨	▨	
021	------				

Form 16
(4/21/86)file:overlap

3. Itemize the matching search terms between each pair of searchers. Fill in the top half of the searcher form. Each match should be described using the line numbers, from the listings, of the matching term. It will be necessary to always list the line numbers in correct searcher number order. That is, when comparing searcher 002 with searcher 005, always list the line number of the term used by searcher 002 first. In some cases, a term has been added to or crossed off the listing. Added terms should be matched; deleted terms should be ignored.

RULES FOR DETERMINING A MATCH:

Disregard the following:
1. a leading or closing parenthesis
2. the contents of parentheses used in phrases, e.g., (w) is the same as (f)
3. limits, e.g., /de

Count the following as a match:
1. singular/plural forms of the same word
2. truncations of the same word
3. verb tenses of the same word
4. parts of speech of the same word

Note:
All words of a phrase must be present is the same order to count the phrase as a matching search term. Follow the same rules as just described above for singular/plural, truncation, tense or part of speech.

4. Fill in the bottom table for the number of search terms used by each searcher and the total number of terms which overlap between each pair of searchers. The number of terms used by each searcher is the line number of the last line in the listing for that searcher. Please note: Even if there is a search term added or corssed off the list, use the number of the last line. DO NOT ADD OR SUBTRACT FOR THE ADDED OR DELETED TERM. (The program counted these and the number appearing on the last line is the number appearing in the final data analyses for the 40 questions.) The total number of matching terms for a pair of searchers is a total of the itemized matches recorded in the top table.

EXAMPLE: The following pages show descriptor listings D001011.002 and D001011.005 and the two tables filled in for the two listings.

```
Listing of D001011.002

       1 MIDDLE AGE?(W)CHILD?
       2 MIDDLE(1W)AGE?
       3 MIDDLE AGED/DE
       4 PARENT CHILD COMMUNICATION/DE
       5 PARENT CHILD RELATIONS
       6 PARTENTAL ROLE
       7 MOTHER CHILD RELATIONS
       8 FATHER CHILD RELATIONS
       9 MIDDLE(1W)AGED (1W)CHILD?
      10 MIDDLE AGED CHILDREN/ID
      11 AGING PARENTS/ID
      12 MIDDLE(W)AGED(W)CHILDREN/ID
      13 AGING(W)PARENTS/ID
```

```
Listing of D001011.005

       1 parent child communication
       2 (geront?
       3 geriat?)
       4 parent child relations)
       5 interpersonal communications
       6 interpersonal interaction
       7 parent child relations
       8 middle(w)aged
       9 middle(w)aged(w)children
      10 elderly(w)parent?
      11 older(w)parents)
      12 adult offspring
```

SEARCH TERM OVERLAP

NAME ______________________ TODAY'S DATE _____________

TIME SPENT _______________

Question Number 001 011

Search Term Overlap with Searcher (Itemized)

Searcher Number	005	013	016	021
002	1-9 2-8 5-7 9-9			
005				
013				
016				

Search Term Overlap with Searcher (Total Number)

Searcher Number	Number of Search Terms Used	005	013	016	021
002	13	4			
005	12				
013					
016					
021					

Form 16
(4/21/86)file:overlap

PROCEDURE 10 (3/27/86)

PROCEDURES FOR COMPLETING QUESTION REQUEST FORMS USING THE IBM/XT COMPUTER

1. Turn on the IBM/xt computer, using the switch on right side of the computer.

2. When the computer prompts you for the date and time, enter these using the format 4/1/86 and military time in hours and minutes.

3. Put the QUESTFORM5A diskette in Drive A.

4. At the C> prompt, enter copy a:quest.* c:
Should get response that all QUEST files are copied.

5. Replace the QUESTFORM5A diskette in drive A with PCWRITE2.

6. At the C> prompt, enter the following command ed quest.qqq where qqq represents the question number you will be entering into the database.

7. At the next screen from PCWRITE, press the F1 function key on the left side of the keyboard.

8. You should now have a screen of the form on which you will enter data.

9. Question Number should already be entered for you.

10. Find this question number in the first column of the list entitled "Assignment of Questions to Searchers".

11. Find the DB number in the fourth column of this list, which corresponds to the question number.

12. Enter this DB number on the line on your screen entitled: DIALOG DATABASE USED. Enter a hyphen after the DB number and look up this number on the list entitled: "DATABASE (supplier) and enter the database name (portion in capitals).

13. The remaining data for input is obtained from Form 5, entitled "Question Request Form". Please check with Alice or Donna if you are not sure about the spelling of words as written or if you need clarification of any kind.

14. Item A1. Enter the brief title as written.

15. Item A2. Enter the question statement as written.

16. Item B. If 3 is circled, enter " precise"; if 4 is circled, enter " broad".

17. Item C. Enter the word or phrase following the number circled.

18. Item D. If 11 is circled, enter "English only"; if 12 is circled, enter "any language" and the languages stated, if any; if both 11 and 12 are circled, then enter the information for both.

19. Item E. If 13 is circled, enter " Last 5 years" ; if 14 is circled, enter "No Limits"; if 15 is circled, enter the years specified.

PROCEDURES FOR COMPLETING QUESTION REQUEST FORMS USING THE IBM/XT COMPUTER

20. Item F. Enter any of the items, completed, unless crossed off.

21. Check all of the items you have entered on the screen. Correct any errors you have made.

22. After all the corrections are made, press the function key F1 followed by F2.

23. Turn on the printer, if it is not on, using the switch on the left side of the printer. If both red lights are not on, then also toggle the third button from the bottom, forward towards the label " online". This prepares the printer for printing. Roll the paper forward until the print head is just below the perforation.

24. At the C> prompt, enter pr quest.qqq, where qqq is the question number you have just input.

25. You will be asked some questions, press the return key at the first pause and the esc (escape) key at the second pause. A copy of the data you have just input will be printed. Check this over for any errors.

26. If there are errors, go back to step 6 and re-enter the same question number and make the corrections needed. Then go to step 22 and print a new copy of the printout using steps 24 and 25. Give copies of these printouts to Donna or Alice at the end of the morning and afternoon sessions.

27. If there are no errors, go to step 6 and enter the file name for the next question number you will work on.

PROCEDURE 11 (6/3/86)

PROCEDURES FOR USING DBASE FILES ON COMPAQ COMPUTER

1. Insert the DBase III diskette in drive A.

2. Insert the appropriate DBase Files Diskette in drive B.
   See listing of file contents of Diskettes I and II in item 14.

3. At the A> prompt, type dbase.

4. The DBase III will load and give you a set of options to use. These procedures are based on selecting none of these options but in entering the appropriate DBASE commands at the . prompt. These commands are described in detail in the DBASE Manual and briefly summarized in following items.

5. .set default to b:
   This command is used to tell the program that the DBase Files will be found in drive b:

6. .use file name
   This command is used to tell the program the name of the file you want to work with. For a directory of the DBase files on a diskette, enter the command .dir and a listing of all the files suffixed with .dbf will be listed.

7. .set print on
   If you want to print while in the dbase files, first turn on the printer in the usual way with the on switch and online button, then while in dbase, use the above command. This will print the commands and the file contents if the .list command is used. It will not print any of the contents if the .browse command is used.

8. .set print off
   This command turns off the printer while in dbase.

9. .list
   This command produces a list of all items in the file. The items will scroll without any breaks. This will be printed if the .set print on command has been issued. Records cannot be changed using this command.

10. .browse
    This command lists records, one screen at a time. The fields are listed horizontally and changes can be made to the fields as needed. To move to the next screen or next fields, use the appropriate cursors. When you reach the end of the file, the program will ask you if you want to add new records. Answering yes, allows you to add new records. To get back to the dot command prompt use the esc key.

11. .edit
    This command lists records one at a time in an editing format to enter any changes needed. If a specific record is wanted, the record number should follow this command, for example .edit 3. Upon reaching the last record in the file, the program will ask you if you want to add new records. Answering yes, allows you to add new records. To get back to the dot command prompt use the esc key.

PROCEDURES FOR USING DBASE FILES ON COMPAQ COMPUTER

12. .close databases
This command is used to close the file or database currently active, before using another file. Several databases can be in use, but it is safer to close each database after using it, if it is no longer needed. This command must be used before exiting from dbase.

13. .quit
This command is used to get out of the DBase program. Note that all files should be closed using the .close databases command before using the .quit command.

14. Contents of DBase Diskette I & II
Note - form numbers used for the file name correspond to the printed form numbers, from which the data was entered. In some cases, the files are incomplete if subsequent data was not needed.

DISKETTE I

FILE NAME	FILE CONTENTS
FORM5.DBF	List of questions, database, searcher codes and brief titles
TIME3.DBF	Searcher's preferred time for performing searches
TIME31.DBF	List of preferred search times, listed in order for each searcher

DISKETTE II

FORM3.DBF	List of searcher information, coded from form 3
FORM7_8.DBF	Scheduling of interviews for users and project searchers and other information from forms 7 and 8
FORM11.DBF	Question analysis and classification data from form 11
FORM16.DBF	Search term overlap data from form 16
SCORE.DBF	Cognitive test scores for all searchers
SCONTEXT.DBF	Context values for project searchers on form 9 and outside searchers on form 10.

B>Notes on DBase Commands

Chapter I

DBase COMMANDS - GENERAL

```
a>dBase
   -.command
   -.set default to B: (floppy)
   -.set default to C: (hard disk)
   -.clear (clears screen)
   -.quit (gets you out of Dbase)
   -.dir (list of files)
   -.use file name, without extension (get file for use)
   -.display (displays field names as headings in table)
   -.display all (displays one screen at a time)
   -.display next n (# of records to be displayed)
   -.display record n (to display a specific record)
   -.goto n or -.go n or -.n followed by -.display (to display a specific record
     also)
   -.list (displays all records as a table)
   -.list structure (lists all fields in database and length)
```

Commands can be shortened to 4 letters; field names 10 characters; max 128 fields; up to 10 database files open at once-.

Chapter II

ADDING RECORDS

```
   -.help command
     esc to get back, pg up to previous screen, pg dn to next screen
   -.set menu on (displays the control keys)
   -.append (to add new records)
     automatically in the overwrite mode
     for insert mode, press ins key at insert location & press again to stop
     use del key or backspace to delete characters
   -.edit n (to correct existing record n)
     going to next record saves changes automatically
     to save changes for this record only, use ctrl end;
     to cancel the changes for this record only, use  esc
   -.go top ( to get to beginning of file)
   -.browse ( to view all records ; can use edit, append or insert)
     use ctrl home to see options in browse mode
     ctrl rt arrow & ctrl left arrow to browse to right or left of screen
```

DELETING RECORDS

```
   -.delete record n (marks record for deletion)
     to make invisible for calculations, use command -.set deleted on;
     to make visible again -.set deleted off; to recall records -.recall all
     to remove permanently, follow delete command with command -.pack
   -.edit n followed by ctrl u and ctrl end marks for deletion, ctrl u
     puts record back in
```

SELECTING FIELDS FROM A DATABASE

```
   -.display or -.list or -.browse fields (then list fields of interest)
```

CHAPTER III

SETTING UP DBASE FILES

Most efficient if have 16-20 fields in 1 file and set up more files if needed

Five types of fields
C - character text up to 254 characters
M - Memo kept in separate disk & up to 4000 characters
N - Numeric - numbers, decimals, plus, minus, no commas
L - 1 character - true/false, yes/no
D - date 8 spaces store as julian date

CREATING FILE

-.clear all (to close open files)
-.assist (provides a help screen)
 options
 select set up to create a new file
 select use to modify an existing database or index
 prompts for file name
 prompts for field name, field type, width of field, decimal(?)
 when finished entering fields, ctrl end and return

 to enter memo field, ctrl home puts into test editor and can enter 2 screens
 of notes and ctrl end to return to record

RETRIEVING DATA

-.clear all
-.assist
 options
 select use to view an existing database
 prompts for disk drive a, b, c
 shows directory of files, select file of interest
 select retrieve
 select option of interest, display, sum, average, count, label, report, position
-.quit to end session

CHAPTER IV

SELECTING RECORDS

RELATIONAL AND LOGICAL OPERATORS

Relational operators
-.DISPLAY FIELDS FOR FIELD CONDITIONS
 first set of fields specifies fields to display
 for clause denotes what you field you want to specify relation conditions
 conditions include = < > or combinations of these
 can use to find numeric or characters in all fields except memo or logical fields-. However to find characters type, the characters must be enclosed in single or double quotes-. Note that must specify if want caps or lower case because caps have higher value than lower case-.

Logical operators
 conditions are specified as -.AND-. -.OR-. -.NOT-.

These can be combined with the relational operators-.
and is processed before the or; use parentheses for the logical operators if needed

If you want to save data you can store it as a memory variable, which is like a field name,

```
  -.store data to memory variable
  -.clear
  -.display memory (lists variable name & type & data)
```

now you can use the memory variable name in place of the data

If you want to save the memory variables for use later

```
  -.save to constant
  -.release all
  -.display memory
```

to get them back

```
  -.restore from constant
  -.display memory
```

PROCEDURE 12

PROCEDURES FOR USING PASCAL PROGRAMS - DATA PROCESSING REPORT

NSF Project IST-850 5411 "Experiments on the Cognitive Aspects of Information Seeking and Information Retrieving"

DATA PROCESSING REPORT - May 6, 1986

I. Introduction and List of Abbreviations and Codes Used in this Report

II. Brief Outline of Programs in Operational Order

III. Program Descriptions

- A. STEP6
- B. STEP7
- C. STEP1 and STEP2
- D. STEP3 and STEP5
- E. STEP4 and STEP9
- F. STEP8 and CFLAG
- G. STEP11
- H. STEP10 and STEP12

IV. Step-by-Step Procedures for Running Programs

- A. Procedures for Processing Dialog Transcripts
- B. Procedures for Processing Evaluated Abstracts and for Producing Final Data Summaries

V. Files Used and Created by Each Program

VI. Files Categorized by File Content

VII. File Storage

VIII. Examples of Files

- A. S039.TXT
- B. S029008.039 (Unedited)
- C. S029008.039 (Edited)
- D. C029008.039
- E. T029008.039 (Online)
- F. T029008.039 (Total)
- G. Q029008.039
- H. Q029008.DAT
- I. Q029008.COD
- J. F029008.ABS
- K. F029008.039
- L. F029008.DAT
- M. Q029008.OUT
- N. D029008.039
- O. SEAR039.OUT
- P. QUES029.OUT

files: Title page: dpr.tc; I. dpr.int; II. dpr.out; III. dpr.pro; IV.A. dpr.run; IV.B. dpr.ran; V. dpr.lis; VI. dpr.cat; VII. dpr.sto; VIII. dpr.exa

III. PROGRAM DESCRIPTIONS

A. STEP6

This program was designed to edit the Dialog online transcript file produced using Smartcom by each searcher. The online transcript was recorded on diskette at the time of the actual search. A printed copy of the transcript was also recorded at the time of the original search. The transcript recorded on the diskette included every key stroke the searcher used. Typos were included. It also included all Dialog system responses to every command used by the searcher. Searchers were instructed to search as they normally would. They were not, however, instructed to download, or print out abstracts as answers to the questions they searched, except as they needed to see the retrieval results they produced. Instead, searchers were instructed to produce their final answers in Dialog format 1, accession number only. Later these accession number sets were processed by project staff and abstract sets produced.

The purpose of STEP6 was to edit or select from the complete transcript those portions of the transcript desired for further study. These portions of the transcript were identified as 1) all commands used by the searcher, e.g. select commands, type commands, begin commands, etc. 2) Dialog accession numbers produced by all type commands 3) the cost and time spent in each Dialog file used.

The search transcript on diskette was named the "sss" file, where "sss" was the number assigned to the searcher. STEP6 read in an "sss" file and created an S"sss".TXT file for that searcher. The S"sss".TXT file included only those portions of the "sss" file mentioned above.

III.B. STEP7

The purpose of STEP7 was to further organize the search transcript according to the intended use for each part. The commands used by the searcher were analyzed for strategy and search terms used. The accession numbers of the documents retrieved were needed to produce a set of abstracts. The cost and time information was used for records of time spent.

STEP7 read in the S"sss".TXT file and separated it into three sets of files for each question the searcher did. The three files for each question included: 1) an S"qqqbbb"."sss" file of type commands and accession numbers 2) a C"qqqbbb"."sss" file of commands used 3) a T"qqqbbb"."sss" file of time spent and cost. In this case, "qqqbbb" represents the question number/ database number. The number of files produced by STEP7 for the searcher text file was 3 (one for each S"qqqbbb"."sss" C"qqqbbb"."sss" and T"qqqbbb"."sss") times the number of questions searched.

So, for example, if searcher 001 did 6 questions, from the S001.TXT file, STEP7 would produce one S"qqqbbb".001, one C"qqqbbb".001 and one T"qqqbbb".001 file for each of the 6 questions, for a total of 18 files.

III.C. STEP1 and STEP2

The purpose of STEP1 and, in part, STEP2 was to create master lists of the question/database numbers and the searchers who did each question. The list of searcher who did a particular question was used later in subsequest programs as a prompting and record keeping mechanism. The other purpose of STEP2 was to create sorted and merged sets of accession numbers. Each program will be described individually.

STEP1

This program produced a master list of question/database numbers called the TOTAL.LST file. As a question/database number was added to the TOTAL.LST file, the program also named a Q"qqqbbb".LST file for that question.

STEP2

STEP2 had two functions. The first function was to sort and merge sets of accession numbers which were read in. Because each question was searched 9 times, the accession numbers produced by each individual search of a particular question had to be sorted and then merged, eliminating duplicates, so that one set of accession numbers, representing the combined results of all 9 searches, could be uploaded to Dialog and an abstract set downloaded.

The second function of STEP2 was to fill in the Q"qqqbbb".LST file with the searcher numbers of all of the searchers who did that question.

For the question being processed, STEP2, as instructed by the operator, read in each S"qqqbbb"."sss" file of accession numbers retrieved by each searcher who did the question. The 9 S"qqqbbb"."sss" files for the question were each sorted individually. The sorted sets were named Q"qqqbbb"."sss" files. The 9 Q"qqqbbb"."sss" files were then merged into one set of sorted accession numbers called the Q"qqqbbb".DAT file for the question. This was the file that was subsequently used to produce the abstract set.

In addition, as each searcher's accession number set was read in, the searcher's number was added to the the Q"qqqbbb".LST file for future use.

III.D. STEP3 and STEP5

The purpose of STEP3 and STEP5 was to produce sets of abstracts in a form appropriate to send to the users who submitted the 40 research questions. STEP3 was used to create a set of accession numbers that Dialog could read. STEP5 was used to add a relevance judgement blank to the downloaded abstracts.

STEP3

In order to obtain actual abstracts from the Dialog system (searchers did not do this; they only produced accession number sets), the merged set of accession numbers for each question had to be uploaded to Dialog. STEP3 was used to prepare the accession number sets for this purpose. STEP3 processed the merged accession number set for each question and produced a set of accession numbers which included a Dialog "keep" command for each individual accession number in the merged set. STEP3 read in the Q"qqqbbb".DAT file for the question and created a Q"qqqbbb".COD file for the question. This is the file that was then uploaded to Dialog. The abstracts were then downloaded into a file named Q"qqqbbb".ABS.

STEP5

The downloaded abstract file for each question, named the Q"qqqbbb".ABS file, was then processed using STEP5. This program inserted a blank form after each abstract in the Q"qqqbbb".ABS file. The blank form was provided to the user for his or her evaluation of each abstract. The blank form looked like this:

```
RELEVANT _______   PARTIALLY RELEVANT _______   NOT RELEVANT _______
```

The file created by STEP5 was named the F"qqqbbb".ABS file. This file was printed on two-part form and mailed to the user.

III.E. STEP4 and STEP9

The purpose of these two programs was to process the evaluated abstracts. These programs assigned the relevance judgements about each abstract to the accession number representing that abstract. This relevance information was used as final data about the question searched and the searchers who performed the search.

STEP4

For the question being processed, STEP4 wrote out, in turn, each accession number from the merged accession number set in the Q"qqqbbb".DAT file. As the individual accession number was displayed, the operator, using the printed set of abstracts with evaluations returned from the user, input the relevance judgement.

After all of the individual judgements for each abstract in the set for the question were input, the information was recorded in a file named F"qqqbbb".DAT. The F"qqqbbb".DAT file included each of the accession numbers from the Q"qqqbbb".DAT file, but included additionally for each accession number in the file a code for the specific relevance judgement returned about the corresponding abstract.

STEP4 also produced a file named Q"qqqbbb".OUT. This file was a list of each accession number in the set for the question with the words, RELEVANT, PARTIALLY RELEVANT, NOT RELEVANT and NOT EVALUATED following each accession number. This file, when printed out, was used to check the accuracy of the input of the relevance judgements.

STEP9

STEP9 was used both to edit relevance judgements and to assign the relevance judgements back to the individual searchers who searched the question. If an error was found in the relevance judgement input, STEP9 allowed the operator to edit the relevance judgement supplied. After the relevance judgements were checked and found to be accurate, STEP9 was used to assign the relevance judgements back to the accession numbers produced by each individual searcher of the question.

STEP9 used the F"qqqbbb".DAT file and compared each accession number in the file with the accession number in the individual searcher's Q"qqqbbb"."sss" file. The relevance judgements for the question as a whole, as represented in the F"qqqbbb".DAT file, were then assigned back to the accession number sets of the 9 searcher's who performed the searches of the question. This information was stored in 9 F"qqqbbb"."sss" files.

III.F. STEP8

The purpose of STEP8 was to calculate the time spent by each searcher to do each question he or she was assigned. The total amount of time spent by each searcher doing each question was calculated by adding the time he or she spent online to the time he or she spent offline preparing to go online. Each of these amounts of time was recorded and the data was included in the final data about each question and each searcher.

The amount of time spent online for each search was captured during the original online session. The online time was stored in the T"qqqbbb"."sss" file by the program STEP7. STEP8 was used to add the offline time to the online time, record each value, and calculate a value for the total time spent by each searcher on each question. Using the Q"qqqbbb".LST file for the question as knowledge about which searchers did the question, STEP8 prompted, in turn, for a time spent offline by each searcher listed in the Q"qqqbbb".LST file. The time offline, time online, and the total time were then stored in a revised version of the T"qqqbbb"."sss" file.

CFLAG

This program was used to edit the Q"qqqbbb".LST file. It was, in essence, actually a subroutine of the program STEP8. Because it was added later, it became a separate program. The purpose of CFLAG was to enable STEP8 to procede anew if the first run of the program failed to read the T"qqqbbb"."sss" file accurately.

III.G. STEP11

STEP11 was designed to determine the search terms used by each searcher for each question searched. The program selected these search terms from the command statements used by the searcher.

The commands used by each searcher to search each question were stored in the C"qqqbbb"."sss" file for that question "qqqbbb" and that searcher "sss". This file was read-in to STEP11. The program then selected out the search terms used. Essentially, STEP11 ignored the actual commands such as "ss" or "c" or "t", the set numbers such as "s3" or "s4", and the operators such as "and" or "or" and wrote the resulting words as a list of search terms into a file called D"qqqbbb"."sss". STEP11 also counted the total number of search terms found in each C"qqqbbb"."sss" file. This value was then used as final data in the final question data and final searcher data files.

III.H. STEP10 and STEP12

The.purpose of these two programs was to cumulate the data produced by the other programs into final data files. The final data was presented in two different cumulations of essentially the same data. A final data file was prepared about each searcher by STEP10. A final data file was prepared about each question by STEP12. The final searcher data file was itemized by each question he or she searched. The final question data file was itemized by each searcher who searched that question.

Both STEP10 and STEP12 used the same data files as input. These files included the evaluated accession numbers for each searcher who did the question, stored in the 9 F"qqqbbb"."sss" files, the commands and search terms used, stored in the 9 C"qqqbbb"."sss" files and the 9 D"qqqbbb"."sss" files, and the time spent, stored in the 9 T"qqqbbb"."sss" files. STEP12 used additionally the merged set of evaluated accession numbers for the question, stored in the F"qqqbbb".DAT file.

STEP10 produced, using an updating process, a final report about each individual searcher. As each question was completed, the information about the question was added as an update to the searcher final data files for those searchers who did the question. The fianl searcher data file was named the SEAR"sss".OUT. In this case, as before, "sss" represented the number assigned to that searcher.

STEP12 produced a final report about the individual question in a file called the QUES"qqq".OUT. Here, "qqq" represented the number assigned to that question.

IV.A. PROCEDURES FOR PROCESSING DIALOG TRANSCRIPTS

The Dialog search session was captured on diskette and on a print-out. The procedure described here includes all processing of the Dialog transcript through the production of an abstract set which was sent to the user. A second procedure titled, "Procedure for Processing Evaluated Abstracts" describes the second half of the total data processing procedure.

The procedure for processing the Dialog transcripts foollows:

1. Copy the search transcript created on a diskette into the /xt drive containing the STEF.EXE programs. In this case, in order to access the desired drive, at the main menu prompt enter, "nsf" The command will be, C>nsf Copy the transcript file onto the hard disk. The search transcript file was named "sss" where "sss" was the number assigned to that searcher. To copy the file onto the hard disk use the command, G>copy a:"sss" (This procedure is also described in "Procedure No. 7" which was an instruction sheet used by project staff at the time the searches were being done. For a copy of "Procedure No. 7" refer to the "Procedures" which are the written instructions used for all the various tasks involved in the project.)

2. Make two backup copies of the search transcript on two separate diskettes. These two diskettes are labeled with the searcher's number "sss". Project searches were backed up in a slightly different way. Because the project searchers reused their project searcher numbers, e.g., 120, 220, 320, 420 were used for each question project search 020 did, the backup files for the project searches carried batch designations in the form of an alpha character. For example, project searcher transcript files included 120-420, 120A-420A, 120B-420B, etc. (The corresponding text files, as will be explained later in these procedures, also had a similar batch designation, such as, S120A.TXT, S220A.TXT, S320A.TXT, S420A.TXT, S120B.TXT, etc.)

3. Type the "sss" file onto the screen. Use the command, G>type "sss" By stopping and starting the scrolling, ctrl s, make sure all questions assigned to that searcher are present. It is possible that the searcher did not record all of his or her search on the diskette. This can happen after a cut-off from Telenet, etc. When a potion of a search was missing from the diskette but was recorded on the print-out, the search was, in most cases, rekeyed by project staff. Alternately, in some cases, and always if the search was not on the print-out either, the question was assigned to another searcher.

4. Run STEP6. This program selects portions of the transcript desired for further study. The portions identified for further study were 1. All searcher commands. Search commands always follow a Dialog system prompt. The prompt in the Dialog system is a "?". 2. All Dialog system responses to a searcher "type" command excluding all but the Dialog accession number of a citation "typed" 3. The cost and time spent system response to a "begin" command or a "logoff" command.

STEP6 is run by giving the following command, G>STEP6

The system will respond by asking for the seaarcher number. The operator supplies the searcher's assigned number, "sss".

When the program is finished running, look at the file created on the screen to make sure the program accurately selected the desired data from the Dialog transcript. The file created by STEP6 is called the text file and it is named S"sss".TXT where "sss" is the number assigned to the searcher. The command to use to see the text file is, G>type S"sss".TXT

Especially, when viewing the text file, make sure all accession number sets are present. If there was a typo in the Dialog "type" command, the program STEP6 may have dropped the corresponding set of accession numbers. If this happens, the "sss" file must be edited using PCWrite. Then rerun STEP6.

INSTRUCTION FOR EDITING USING PC-WRITE

PC-Write was loaded into another subdirectory,in this case, F>. At the F> prompt, use the PC-Write edit command: "ed" and name the drive specification and file to be edited, in this case g:"sss". The command would be as follows:

```
        F>ed g:"sss"
```

After editing the file, save the file using the PC Write procedures F1 F3. Exit to the system, F1 F2.

5. Print-out the text file using a line print command, G>lprint S"sss".TXT

6. Compare the print-out of the text file with the original print-out of the search transcript. Make sure all commands, times and costs, and accession numbers retrieved appear in the text file. The text file is edited using PC Write in the same way as just described. Correct all typos. The text file must be in a specified order as described below:

?b"bbb"	(first question) begin command to enter the assigned database
?*q"qqq"	(first question) question number
the search	(first question)including all searcher command statements, and all Dialog system responses in the form of accession numbers
?b"bbb"	(second question) begin command and database number
$	(first question) Dialog response of cost and time online in first database used
?*q"qqq"	(second question) question number
the search	(second question)
etc.	
the search	(last question)
?logoff	
$	(last question) cost and time

7. Delete the "sss" file from the hard disk using the command, G>del "sss" If there were corrections necessary on the "sss" file in order for STEP6 to work properly, before deleting, copy the corrected "sss" file over the two copies of the "sss" files on the two backup diskettes already created in the second step of these instructions.

8. Next run the program STEP7. This program separates the text file into three categories of files:

1. Accession numbers 2. Commands 3. Cost and time.

There will be one of each of these files for each question represented in the text file, for a total number equal to 3 times the number of questions searched. To run the program, at the G> ask for "STEP7". The system will ask for the searcher number. The operator supplies the searcher number, "sss". The program runs and when it is finished responds that the original file has been separated into three categories of files, as just described. These files are named S"qqqbbb"."sss" C"qqqbbb"."sss" T"qqqbbb"."sss" where "qqqbbb" represents the question number/database number of each question searched and "sss" represents the searcher's number. STEP7 creates a total of 3 times the number of questions searched for each text file input. After STEP7 is run, the operator should check that all the desired S"qqqbbb"."sss" C"qqqbbb"."sss" and T"qqqbbb"."sss" were created. To do this, use a directory command in the form, G>dir ?"qqqbbb".* If they were not all created, there is a problem in the text file. Go back and edit the text file again. Pay particular attention to the format of the begin command and the ?*q"qqq" question number line. Then rerun STEP7.

9. After STEP7 is finished, copy the text file onto the two searcher backup diskettes. Use the command, G>copy S"sss".TXT a:
Project searches are backed up in batches on two backup diskettes. In addition, different batches are given various designations so as to be able to tell them apart. For example, project searcher 020 had the following text files, S120.TXT, S220.TXT, S320.TXT, S420.TXT, S120A.TXT, S220A.TXT, S320A,TXT, S420A.TXT, S120B.TXT, etc.

Also copy all of the S"qqqbbb"."sss" C"qqqbbb"."sss" and T"qqqbbb"."sss" files done by the searcher onto one of the backup searcher diskettes by using the command,

```
G>copy *."sss" a:
```

Also copy the T"qqqbbb"."sss" online time files onto a cumulated diskette of T (online) files. These files have the label TOFile1 through TOFile4. They are arranged by question numbers. Questions 1 through 10 are on the TOFile1 diskette; questions 11 - 20 on the TOFile2 diskette; questions 21 - 30 on the TOFile3 diskette and questions 31 - 40 on the TOFile4 diskette.

10. Delete the text file from the hard disk using the command,

```
G>del S"sss".TXT
```

11. After all searches of a question are completed by all 5 searchers and 4 project searches, and all the S, C, T files for the question are created, print-out all the S files for the question. There will be 9 S files, 5 for the searchers and 4 for the project searches. Use the automatic print feature of the DOS, Ctrl/Prt Sc, to turn on the printer and then use a "type" commands and name each desired file. The commands will be,

```
G>type S"qqqbbb"."sss"
```

12. Compare the print-outs of the S"qqqbbb"."sss" files for question "qqqbbb" with the print-outs of the text files for the searchers who searched that question. Determine which accession numbers the searcher intended for his or her answer. Searchers on Dialog typed as many citations as needed to review the results of their retrieval efforts. However, they were instructed to designate those citations desired for their final answers by typing them in Dialog format 1.

13. Edit the S"qqqbbb"."sss" files leaving only the accession numbers that the searcher wanted as his or her final answer. This can be done using PC Write and following the instructions outlined above.
In some cases, the searcher will not have produced an answer. If the searcher's result is an empty set, replace the void with a zero, 0.
In essence then, their set will include one accession number, a zero.
In the final data files, QUES"qqq".OUT and SEAR"sss".OUT, produced by the programs STEP10 and STEP12, this result will be represented as one "not evaluated" citation retrieved eventhough they really did not retrieve anything. This was corrected manually in the final data files. The following searchers produced empty sets:

> Searcher 006 Question 007; S003 Q018; S014 Q018; S026 Q018; S025 Q024; S036 Q028; S001 Q033; S015 Q039

14. Run STEP1 and STEP2.

STEP1 asks, "Is this the first time to run this program?" Answer: NO (unless you are beginning with a whole new project and a new batch of questions) STEP1 also asks for the number of question/database numbers being added. Answer as many as you have. Then, the program will ask for specification of the actual "qqqbbb" numbers.

STEP2 asks the operator first for the number of question/database numbers to be processed, then for the specific "qqqbbb" number and then for the searcher numbers "sss" of the searchers who did the question. The operator inputs, in turn, each searcher who did the question. There will be 9 inputs, 5 for the searchers and 4 for the project searches.
The searcher is input by using the searcher number "sss". The searcher numbers should be input in ascending order with the project search numbers last and also in ascending order. For example, if searchers 001, 002, 003, 004 and 005 and project searcher 118 did the question, the searcher numbers would be input one at a time 001, then 002, then 003, then 004 then 005, then the project search numbers 118, 218, 318, and finally 418.

STEP2 produces a Q"qqqbbb"."sss" file for each searcher for the question "qqqbbb" and one Q"qqqbbb".DAT file for the question. The Q"qqqbbb"."sss" files are comparable to the S"qqqbbb"."sss" files except the accession numbers are in order. The Q"qqqbbb".DAT file is a merged set, in descending order, of all accession numbers retrieved by all searchers for the question.

15. Print-out the Q"qqqbbb".DAT file for the question using a line print. The command should be,

```
G>lprint Q"qqqbbb".DAT
```

Doing a line print of the Q"qqqbbb".DAT file tells you how many accession numbers are included in the merged set.

16. Copy the edited S"qqqbbb"."sss" files onto backup diskettes of cumulated edited S"qqqbbb"."sss" files. These files are labeled SFile1 through SFile4 according to the questions included on each diskette. SFile1 includes questions 1 - 10; SFile2 questions 11 - 20; SFile3 questions 21 - 30; and SFile4 questions 31 - 40.
Delete the edited S"qqqbbb"."sss" files for the question using the command,

```
G>del S"qqqbbb".*
```

17. Run STEP3. This program prepares the merged accession number set so it can be uploaded to Dialog and full records with abstracts downloaded. The program does this by adding a Dialog "keep" command to each accession number in the file and creating a new file named the Q"qqqbbb".COD file. The program asks for the "qqqbbb" number. The operator supplies it.

18. Copy the Q"qqqbbb".COD file onto a new diskette. Use the command,

```
G>copy Q"qqqbbb".COD a:
```

Delete the Q"qqqbbb".COD file from the hard disk using the command,

```
G>del Q"qqqbbb".COD
```

19. Upload the Q"qqqbbb".COD file from the diskette to Dialog using 1200 baud Smartcom. Download the first 150 abstracts onto the diskette. Name the downloaded abstract file Q"qqqbbb".ABS

DIALOG UPLOADING/DOWNLOADING

Logon to Dialog2 using the 1200 baud Smartcom mounted on the pc. From the Smartcom menu ask for a "send file" option 3, using "send lines" mode option 5. The name of the file to send is the Q"qqqbbb".COD file. This file is on a floppy diskette that has been loaded into the auxiliary drive. The Smartcom software asks for name of file to send. The operator responds with the drive designation and the file name. The command will look like this: NAME OF TO SEND FILE: a:Q"qqqbbb".COD At this point, the software will begin sending the file to Dialog and Dialog will respond by creating a set including all of the accession numbers sent. When the entire set has been sent, the software will respond with a message "Send complete". The operator will key in F1 using the F1 key. Then from the Smartcom menu the operator should select "receive file" option 4, and "stop/start" option 2. The software will ask for the name of the file to receive. From the Dialog system three files in total will be received. 1. all accession numbers sent 2. accession number 1-150 3. abstracts of records 1-150. In cases where the merged set of accession numbers is 150 or less, receive only 1. all accession numbers and 3. all abstracts. Set 1 is named Q"qqqbbb".ACC; set 2 is named Q"qqqbbb".AC; and set 3 is named Q"qqqbbb".ABS. Each of these files should be received on the diskette in the auxiliary drive. Therefore each file should be named with an a: drive designation as follows:

a:Q"qqqbbb".ACC; a:Q"qqqbbb".AC; a:Q"qqqbbb".ABS

After naming the file to receive, the software sends the operator back online. The operator enters the appropriate Dialog "type" command for the desired Dialog system output. For the accession number set the Dialog command is,

```
?t0/1/all
```

For the 150 accession number set, the Dialog command is,

```
?t0/1/1-150
```

For the abstract set the Dialog command is,

```
?t0/5/1-150 (if less than 150 in the set use ?t0/5/all)
```

After downloading each file hit the F1 key to close the file. After all three are downloaded, logoff Dialog. Then end the Smartcom software using "end communication" option 0.

20. Copy the abstract file from the diskette into the hard disk. The command to use is,

```
G>copy a:Q"qqqbbb".ABS
```

21. Run STEP5. This program inserts a relevance judgement blank at the end of each abstract in the Q"qqqbbb".ABS file. After asking for STEP5 the system asks for the question/database number. The operator supplies the "qqqbbb" number. The abstract file with evaluation blanks, produced by STEP5, has the name F"qqqbbb".ABS
Type out the F"qqqbbb".ABS file on the screen using `G>type F"qqqbbb".ABS` to make sure that the evaluation blanks are in correct position at the end of each abstract. The program STEP5 may insert extra blanks if there are slashes appearing in the text of the abstracts. This is common in abstracts about chemistry. The F"qqqbbb".ABS file can, if necessary, be edited using PC Write and the procedures for using PC Write outlined above.

22. Delete the Q"qqqbbb".ABS file from the hard disk using the command,

```
G>del Q"qqqbbb".ABS
```

23. Print the F"qqqbbb".ABS file onto 2-part form using the command,

```
G>print F"qqqbbb".ABS
```

24. Delete the F"qqqbbb".ABS file from the hard disk using the command,

```
G>del F"qqqbbb".ABS
```

25. Send the abstract set and a copy of Form 12 to the user.

IV.B. PROCEDURES FOR PROCESSING EVALUATED ABSTRACTS AND FOR PRODUCING FINAL DATA SUMMARIES

The process described in the following steps is done after the evaluated set of abstracts is returned by the user. The procedure for processing the evaluated abstracts and producing final data summaries follows:

1. The data files and execution programs required to process the data at this point are all located in the same directory as the programs and files described in the first part of the step-by-step procedures in this report. On the IBM/XT the programs and files are accessed using the command, nsf, from the first prompt after the main menu is displayed. After this opening command, the operator will have a G> prompt.

2. With the evaluated abstract set in hand, the operator asks for the program STEP4 using the command, G>STEP4
The program responds by asking for a question/database number. The operator supplies it. Next the program will ask how many references will be reviewed. The operator responds with the exact number of abstracts in the set sent to the user. Next the program will begin prompting for each accession number of each abstract in the set. These prompts should follow the order of the accession numbers of the abstracts in the printed abstract set. As each accession number is displayed, the operator supplies the relevance judgement provided by the evaluator. The operator will enter either
R, P, N, or E where R - Relevant, P - Partially Relevant, N - Not Relevant, and E - Not Evaluated are the codes used for the evaluation judgements. After all of the judgements have been entered, the system responds with the message that the F"qqqbbb".DAT evaluated accession number file has been created and that the relevance judgements just supplied can be printed out. The file that can be printed out is called the Q"qqqbbb".OUT file.

3. Print out the Q"qqqbbb".OUT file using the command, G>lprint Q"qqqbbb".OUT Compare this printed file with the printed abstract set. Make sure all relevance judgements were assigned correctly.

4. Now the final judgement assignments can be made. The operator should ask for the program STEP9, using the command G>STEP9 The program will ask and the operator will supply question/database number. The program will then ask if the operator wants to edit or make final form. If errors were found in the printed Q"qqqbbb".OUT file, these can now be corrected by asking to edit. The operator asks to edit by answering e to the following question,

Do you want to edit or make final form (e/f)? e

The system will ask for the accession number to be edited. The operator supplies the accession number. The system displays the current judgement. The operator can input a new value. This process continues until the operator answers no to the question, More editing? n

At the beginning of STEP9, if the operator does not want to edit, the first question can be answered f,

Do you want to edit or make final form (e/f)? f

The system will, at both the end of editing loop and at the "f", final form command, produce the final evaluated accession number sets for all accession number sets for that question. This includes the F"qqqbbb".DAT merged set and the 9 F"qqqbbb"."sss" sets for the 9 individual searches of the question.

5. Copy the Q"qqqbbb".OUT file onto the final data diskette for the question. These diskettes are labeled Q"qqqbbb". There is one diskette for each question. Delete the Q"qqqbbb".OUT file from the hard disk.

6. Copy the Q"qqqbbb".LST file, the Q"qqqbbb".DAT file, the F"qqqbbb".DAT file, and the 9 Q"qqqbbb"."sss" files and the 9 F"qqqbbb"."sss" files to the final data diskette for the question labeled Q"qqqbbb" Also, copy the Q"qqqbbb".DAT file and the 9 Q"qqqbbb"."sss" files to the cumulated Q Files diskettes. These diskettes are labeled, QFile1 through QFile8 according to the question number included on the diskette. QFile1 includes questions 1-5; QFile2 questions 6-10; QFile3 questions 11-15; QFile4 questions 16-20; QFile5 questions 21-25; QFile6 questions 26-30; QFile7 questions 31-35; QFile8 questions 36-40.

Also copy the F"qqqbbb".DAT file and the 9 F"qqqbbb"."sss" files to the cumulated F File diskettes. These diskettes are labeled, FFile1 through FFile4 according to the question numbers included on each. FFile1 includes questions 1-10; FFile2 questions 11-20; FFile3 questions 21-30; FFile4 questions 31-40.

7. Delete the Q"qqqbbb".DAT file and the 9 Q"qqqbbb"."sss" files from the hard disk. This can be done in three commands, G>del Q"qqqbbb".DAT, G>del Q"qqqbbb".0??, G>del Q"qqqbbb".?20 (or ?19)

8. Next the operator should complete the time files. STEP8 is used to add the offline time to the online time. The online time is already present in the T"qqqbbb"."sss" file. The operator will supply an offline time and the program will add the two times together.
Before beginning STEP8 the operator should check the length of each T"qqqbbb"."sss" file for the question. To do this use a directory command, G>dir T"qqqbbb".* The online time file should be 26, 27, 28 or 29 bytes in length. If the file is longer as it will be if Dialog1 was used, the T"qqqbbb"."sss" file must first be edited using PC-Write (procedures outlined in part one of these Step-by-steps) to eliminate words such as "9Descriptors"
Then the operator asks for STEP8 using the command, G>STEP8
The program asks for the question/database number. The operator supplies it. The system will access the Q"qqqbbb".LST file for the question and using the information in that file, prompt for an offline time for each searcher found in the Q"qqqbbb".LST file. The operator supplies the time in minutes from the work form used by the searcher to prepare the question offline. The program converts the offline time to a fraction of an hour and adds the value to the file. Then the program adds the online time to the offline time and adds a total time value to the T"qqqbbb"."sss" file. After running STEP8 for the question, all T"qqqbbb"."sss" files should be inspected to make sure the program converted the original T"qqqbbb"."sss" file properly. This can be done by using the directory command and inspecting the length of the files produced. The new T"qqqbbb"."sss" files should be 103 bytes.
If any T"qqqbbb"."sss" file was not converted, CFLAG program can be used to enable STEP8 to run again. Make sure the Online T"qqqbbb"."sss" file is proper. Ask for CFLAG using the command, G>CFLAG
The program will ask for the question/database number. When supplied, the program will display in turn each searcher number and ask if you want to change the flag for that searcher. When the searcher number of the T"qqqbbb"."sss" file that was not converted is displayed answer yes to the question, The flag on searcher "sss" is 1 do you want to change it to 0? y
STEP8 can now be rerun.

9. Copy the Total Time T"qqqbbb"."sss" files to the final question data diskette for the question. The final question data diskettes for each question are labeled Q"qqqbbb". Also copy the Total Time T"qqqbbb"."sss" files to the cumulated T File diskettes. These diskettes are labeled TFile1 through TFile4 according to the questions included on the diskette. TFile1 includes questions 1-10; TFile2 quesitons 11-20; TFile3 questions 21-30; TFile4 questions 31-40.

10. Search terms used by each searcher for each question are determined by the program STEP11. The operator aasks for STEP11. The system asks for the appropriate question/database number. The program then processes the C"qqqbbb"."sss" files and creates a D"qqqbbb"."sss" file for each. When the program is finished a descriptor count for each searcher is displayed. This information is stored by the program for use in final data summary programs.

11. Copy the 9 C"qqqbbb"."sss" files and the 9 D"qqqbbb"."sss" files onto the final question data diskette labeled Q"qqqbbb" and on the cumulated CD File diskettes. The cumulated CD File diskettes are labeled CDFile1 through CDFile7 according to the questions included on each diskette. CDFile1 contains questions 1 - 6; CDFile2 questions 7 - 12; CDFile3 questions 13 - 18; CDFile4 questions 19 - 24; CDFile5 questions 25 - 30; CDFile6 questions 31 - 36; and CDFile7 questions 37 - 40.

12. When all of the F"qqqbbb"."sss" files, the F"qqqbbb".DAT file, all of the C"qqqbbb"."sss" and corresponding D"qqqbbb"."sss" files and all of the Total Time T"qqqbbb"."sss" files have been prepared for a given question, the final data summary about that question can be produced. Also, the final data summary about each searcher who did the question can be updated to include that question. The programs which produce the final data summaries are STEP10 and STEP12. Before running either of these programs, make sure that there is a QUES"qqq".LST file named for the question and a SEAR"sss".LST file named for each searcher who did the question. These files are named manually using the line editor.

13. STEP10 can now be run for the question. After asking for STEP10, the program will ask for the question/database number. The program then proceeds to access the files just described and updates the fianl data summary of each searcher who did the question.

14. The final data summary about the question can also be produced. The operator asks for STEP12. The program asks for the question/database number. The program then asks the operator to supply the data from Form 12 "User Evaluation of Answers". The program then produces the final data summary about the question in a file named QUES"qqq".OUT As described in IV.A.13. of these procedures, where a searcher's empty accession number set was replaced with a zero, the final data will be off by 1 in the "# not evaluated" and "total references retrieved" listings for both the question as a whole and for the individual searcher who produced the empty set. These values should be corrected. This can be done manually, although the programs could be revised to check for a zero as an accession number. The accession number zero should not be counted.

15. Print the final question data using the command, G>print QUES"qqq".OUT

16. Copy the QUES"qqq".OUT file to the final question diskette already described having the label Q"qqqbbb". Also copy the QUES"qqq".OUT to the cumulated final question data file labeled QUESOUT.

17. Delete the C"qqqbbb"."sss" D"qqqbbb"."sss" and Total T"qqqbbb"."sss" files from the hard disk.

18. When all the questions searched by a given searcher have been processed through STEP12, the searcher final data file is also complete. This file is named SEAR"sss".OUT As described in IV.A.13. of these procedures, for searchers who produced an empty set of accession numbers, the empty set was replaced with a zero as an accession number. This zero was counted as an accession number by the program STEP10 when it should not have been. The final data tallies in the categories "# not evaluated" and "Total number retrieved" for the question as a whole and for the individual searcher producing the empty set were off by one extra count. This was corrected manually after the SEAR"sss".OUT files were complete. The tallies for the question as a whole were corrected in each SEAR"sss".OUT file of each searcher who did the question. The tallies in the individual searchers data was only corrected in his or her SEAR"sss".OUT file. When the SEAR"sss".OUT file for a searcher is complete, copy the file to the searcher backup diskette (described in part 1 of this step-by-step). Also copy the file to the cumulated search final data diskettes labeled SEAROUT1 and SEAROUT2. SEAROUT1 includes searchers 001 - 020; SEAROUT2 includes searchers 021 - 041 (not inclusive).
The final searcher report can be printed using the command,
G>print SEAR"sss".OUT

V. FILES USED AND CREATED BY EACH PROGRAM

File Name	Description
"sss"	The Dialog transcript was created online and was processed by STEP6. There were a total of 36 of these files, one for each searcher who participated. Additionally, there were a number of these files for project searches.
S"sss".TXT	The text file for each searcher was created by STEP6 and processed by STEP7. Again, there were a total of 36 of these files. Additionally, there were a number of these files for project searches.
TOTAL.LST	The total list file was a master list of all questions. Created (initially) and subsequently updated by STEP1. There was only one TOTAL.LST file.
Q"qqqbbb".LST	The question list files were master lists of all searchers of each question. Named by STEP1, data was input by STEP2. There were a total of 40 of these files, one for each question.
S"qqqbbb"."sss"	The S files included type commands and accession numbers. Created by STEP7, edited using PC Write or WORDSTAR, the edited versions were processed by STEP2. There were 9 of these files for each question, and a grand total of 360 for all 40 questions.
C"qqqbbb"."sss"	The C files included all commands used by a searcher for a question. Created by STEP7, they were processed by STEP11. They are used as data input to STEP10 and STEP12. There were a total of 9 of these files for each question, and a grand total of 360 files for all 40 questions.
T"qqqbbb"."sss"	The T (online) files included time and cost online. Created by STEP7, they were processed by STEP8. STEP8 produced an edited version of the files including time online, time offline, and total time spent. The revised T"qqqbbb"."sss" was used as data input to STEP10 and STEP12. There were a total of 9 of these files for each question, and a grand total of 360 files for all 40 questions.
Q"qqqbbb"."sss"	The Q files were sorted accession numbers files. Created by STEP2, they were processed by STEP9. There were a total of 9 of these files for each question, and a grand total of 360 for all 40 questions.

V. Cont.

Q"qqqbbb".DAT	The Q .DAT files included merged, sorted accession numbers for each question. Created by STEP2, they were processed by STEP3 and STEP4. There were a total of 40 of these files, one for each of the questions.
Q"qqqbbb".COD	The Q .COD files included the merged accession number sets with Dialog "keep" commands. Created by STEP3, they are processed by Dialog. There were a total of 40 of these files, one for each question.
Q"qqqbbb".ABS	The Q .ABS files contained abstracts downloaded from Dialog. They were processed by STEP5. There were a total of 40 of these files, one for each question.
F"qqqbbb".ABS	The F .ABS files were sets of abstracts with evaluation blanks inserted. Created by STEP5, they were printed.
F"qqqbbb"."sss"	The F files were accession numbers with evaluations. Created (or edited) by STEP9 they were used as data input to STEP10 and STEP12. There were a total of 9 of these files, and a grand total of 360 files for all 40 of the questions.
F"qqqbbb".DAT	The F .DAT files were merged accession numbers with evaluations for the question. Created by STEP4, edited by STEP9 they were used as data input to STEP10 and STEP12. There were a total of 40 of these files, one for each question.
Q"qqqbbb".OUT	The Q .OUT files were merged accession numbers with evaluations in a readable format. Created by STEP4, they were edited by STEP9 and printed. There were a total of 40 of these files, one for each question.
D"qqqbbb"."sss"	The D files were lists of search terms used by each searcher for each question. Created by STEP11, they are used as data input to STEP10 and STEP12. There were a total of 9 of these files for each question, and a total of 360 files for all 40 questions.

V. Cont.

SEAR"sss".LST	This file is used by the program STEP10 in its operation. The SEAR .LST file is named manually using the line editor. There must be one of these files named for each searcher.
QUES"qqq".LST	This file is used by the program STEP12 in its operation. The QUES .LST file is named manually using the line editor. There must be one of these files named for each question.
SEAR"sss".OUT	The final searcher data file was created and subsequently updated by STEP10. There were a total of 36 of these files, one for each searcher who participated. Additionally, there were 12 of these files for project searches.
QUES"qqq".OUT	The final question data file was created by STEP12. There were a total of 40 of these files, one for each question.

VI. FILES CATEGORIZED BY FILE CONTENT

Transcript File

"sss"	Exact transcription of search session, ASCII text file. Created online to Dialog.

Text File

S"sss".TXT	Edited transcript to select command lines, accession numbers, and cost and time. Created by STEP7.

List Files

TOTAL.LST	Master question/database list. Created/updated by STEP1.
Q"qqqbbb".LST	List of searchers of each question. Named by STEP1. Data filled in by STEP2.
QUES"qqq".LST	Used for program STEP12 operation. Named manually.
SEAR"sss".LST	Used for program STEP10 operation. Named manually.

Accession Numbers

S"qqqbbb"."sss"	Unedited (includes type commands) for question by searcher. Created by STEP7.
S"qqqbbb"."sss"	Edited (includes only final set or sets) for question by searcher. Created manually.
Q"qqqbbb"."sss"	Sorted for question by searcher. Created by STEP2.
F"qqqbbb"."sss"	Sorted with evaluations for question by searcher. Created by STEP9.
Q"qqqbbb".DAT	Merged for question. Created by STEP2.
F"qqqbbb".DAT	Merged with evaluations for question. Created by STEP4.
Q"qqqbbb".OUT	Merged with evaluations in readable format for question. Created by STEP4.
Q"qqqbbb".COD	Merged with Dialog keep cammands for question. Created by STEP3.

Abstracts

Q"qqqbbb".ABS	Downloaded. Created online to Dialog.
F"qqqbbb".ABS	With evaluation blanks. Created by STEP5.

Commands

C"qqqbbb"."sss"	All command lines for question by searcher. Created by STEP7.
D"qqqbbb"."sss"	Search terms for question by searcher. Created by STEP11.

VI. Cont.

Time

T"qqqbbb"."sss"	Online time for question by searcher. Created by STEP7.
T"qqqbbb"."sss"	Total time (revised version of original T"qqqbbb"."sss") for question by searcher. Created by STEP8.

Searcher Data

SEAR"sss".OUT	Final data summary about each searcher. Created by STEP10.

Question Data

QUES"qqq".OUT	Final data summary about each question. Created by STEP12.

VII. FILE STORAGE

Backup Files*

Diskette/Label

File Name***	Searcher Backup 1 S001-S041	Searcher Backup 2 S001A-S041A	Final Question Q001"bbb"- Q040"bbb"	Cumulated by File Type**	Delete from G>
"sss"	X	X			after STEP7
S"sss".TXT	X	X		X	after STEP7
Unedited S	X				N/A
C	X		X	X	after STEP12
Online T	X			X	N/A
Edited S				X	after STEP2
Total T			X	X	after STEP12
Q, Q.DAT, Q.LST			X	X	after STEP12 except Q.LST
D			X	with C	after STEP12
F, F.DAT			X	X	Do Not Delete
Q.OUT			X		after STEP4
QUES"qqq". OUT			X	X	Do Not Delete
SEAR"sss". OUT	X			X	Do Not Delete
SEAR .LST				X	Do Not Delete
QUES .LST				X	Do Not Delete

*There are also 40 diskettes labeled Q001"bbb"A-Q040"bbb"A which have the Q.COD and Q.ABS files for each question

**For volume labels of cumulated files see next page

***Files named Unedited S, C, Online T, Edited S, Total T, Q, D, and F each include "qqqbbb"."sss";
Files named Q.DAT, Q.LST, Q.COD, Q.ABS, F.DAT and Q.OUT each include "qqqbbb" before the extension

VII. Cont.

Files Cumulated by File Type

Volume Labels	Files Included	Questions Included
SFile1	edited	1 -10
2	S"qqqbbb"."sss"	11-20
3		21-30
4		31-40
TOFile1	Online Time	1 -10
2	T"qqqbbb"."sss"	11-20
3		21-30
4		31-40
TFile1	Total Time	1 -10
2	T"qqqbbb"."sss"	11-20
3		21-30
4		31-40
QFile1	1. Q"qqqbbb"."sss"	1 -5
2	2. Q"qqqbbb".LST	6 -10
3	3. Q"qqqbbb".DAT	11-15
4		16-20
5		21-25
6		26-30
7		31-35
8		36-40
CDFile1	1. C"qqqbbb"."sss"	1 -6
2	2. D"qqqbbb"."sss"	7 -12
3		13-18
4		19-24
5		25-30
6		31-36
7		37-40
FFile1	1. F"qqqbbb"."sss"	1 -10
2	2. F"qqqbbb".DAT	11-20
3		21-30
4		31-40
QUESOUT	QUES"qqq".OUT	1 -40
SEAROUT1	SEAR"sss".OUT	Searcher 1 -20
2		Searcher 21-41 (not 22 or 31)
SEARLST	SEAR"sss".LST	all searchers
	QUES"qqq".LST	all questions
STXT	S"sss".TXT	Searchers 1 -41

VIII. EXAMPLES OF FILES

The following pages show examples of the various files used and created by the programs described in this report. The name of each file appears in capital letters followed by the file contents. The following examples were taken from question 029; searcher 039.

A. S039.TXT (Only one question included)

```
?b8
?*q029
?s microwaves
?s ceramic materials
?s ceramic materials - sintering
?c 1 and 2
?c 1 and 3
?c 4 or 5
?s ceramic?
?s fir?
?s firing
?s sinter?
?s microwave?
?s radiation
?c 11 and 12
?ds
?c 7 and 9
?c 7 and 10
?c 7 and 11
?c 7 and 13
?ds
?c 14 and (9 or 10) and 13
?t 6/3/1-10
1402491    1366093    1281300    1130844    1089508
0740589    0721339    0720468    0308180    0294930
?c 14 and (9 or 10) and 11
?t 19/3/1-5
1436463    1368412    0506806    0383544    0341824
?c 6 or 19
?t 20/1/1-15
 1436463   1402491   1368412   1366093   1281300   1130844   1089508
  740589    721339    720468    506806    383544    341824    308180
  294930
?b 5
$4.02  0.268 Hrs File8 10 Descriptors
```

VIII. Cont.

B. S029008.039 (Unedited)

```
t 6/3/1-10
1402491    1366093    1281300    1130844    1089508
0740589    0721339    0720468    0308180    0294930
t 19/3/1-5
1436463    1368412    0506806    0383544    0341824
t 20/1/1-15
 1436463   1402491   1368412   1366093   1281300   1130844   1089508
  740589    721339    720468    506806    383544    341824    308180
  294930
```

C. S029008.039 (Edited)

```
 1436463   1402491   1368412   1366093   1281300   1130844   1089508
  740589    721339    720468    506806    383544    341824    308180
  294930
```

D. C029008.039

```
s microwaves
s ceramic materials
s ceramic materials - sintering
c 1 and 2
c 1 and 3
c 4 or 5
s ceramic?
s fir?
s firing
s sinter?
s microwave?
s radiation
c 11 and 12
ds
c 7 and 9
c 7 and 10
c 7 and 11
c 7 and 13
ds
c 14 and (9 or 10) and 13
t 6/3/1-10
c 14 and (9 or 10) and 11
t 19/3/1-5
c 6 or 19
t 20/1/1-15
```

VIII. Cont.

E. T029008.039 (Online)

$4.02 0.268 Hrs File8

F. T029008.039 (Totoal)

```
  0.268 (Online connection time)
  0.250 (Offline connection time)
  0.518 (Total connection time)
```

G. Q029008.039

```
   1436463
   1402491
   1368412
   1366093
   1281300
   1130844
   1089508
    740589
    721339
    720468
    506806
    383544
    341824
    308180
    294930
```

VIII. Cont.

H. Q029008.DAT (Includes only the first part of the file)

```
   1569212
   1565222
   1529876
   1529296
   1521577
   1515392
   1511482
   1509966
   1507612
   1494479
   1490941
   1489628
   1476100
   1471570
   1467354
   1459215
   1452918
   1451044
   1448820
   1448745
   1439545
   1437501
   1437429
   1436463
   1434056
   1434055
   1424745
   1412334
   1410704
   1402491
   1396964
   1393319
   1385383
   1383826
   1368412
   1366093
   1364561
   1362095
   1359704
   1354162  etc.
```

VIII. Cont.

I. Q029008.COD

```
K    1569212; K    1565222; K    1529876; K    1529296; K    1521577; K    15153
92; K    1511482; K    1509966; K    1507612; K    1494479; K    1490941; K    1
489628; K    1476100; K    1471570; K    1467354
K    1459215; K    1452918; K    1451044; K    1448820; K    1448745; K    14395
45; K    1437501; K    1437429; K    1436463; K    1434056; K    1434055; K    1
424745; K    1412334; K    1410704; K    1402491
K    1396964; K    1393319; K    1385383; K    1383826; K    1368412; K    13660
93; K    1364561; K    1362095; K    1359704; K    1354162; K    1349654; K    1
335985; K    1332280; K    1305705; K    1305533
K    1303785; K    1303058; K    1301209; K    1299270; K    1295624; K    12857
27; K    1281300; K    1279025; K    1277749; K    1272060; K    1262238; K    1
262237; K    1255066; K    1250334; K    1238285
K    1237376; K    1229866; K    1229442; K    1219135; K    1197294; K    11750
08; K    1169669; K    1160194; K    1150698; K    1145539; K    1136726; K    1
130844; K    1124464; K    1123756; K    1110065
K    1101445; K    1091166; K    1089508; K    1081393; K    1039863; K    10316
96; K    1016245; K    1015991; K    1010858; K     967579; K     964093; K
962458; K     957783; K     957777; K     956873
K     954047; K     942254; K     932875; K     914497; K     912724; K     8840
03; K     866642; K     865602; K     854915; K     851530; K     844931; K
844102; K     844066; K     842903; K     831822
K     826940; K     823348; K     820577; K     812681; K     791110; K     7910
92; K     788940; K     788787; K     783824; K     776078; K     769671; K
766996; K     766116; K     766017; K     763170
K     763165; K     760780; K     757947; K     749936; K     740589; K     7344
66; K     732985; K     732947; K     730766; K     730022; K     721339; K
720468; K     714642; K     707253; K     696210
K     674461; K     667233; K     665462; K     649848; K     645662; K     6399
57; K     633767; K     629522; K     595557; K     594821; K     592929; K
587673; K     584196; K     572041; K     570129
K     566548; K     566169; K     565886; K     562724; K     560634; K     5565
27; K     552540; K     545300; K     542319; K     535297; K     526419; K
525213; K     525210; K     525195; K     510401
K     508497; K     506806; K     506147; K     504488; K     503582; K     4928
57; K     482630; K     466838; K     459415; K     442755; K     436332; K
436117; K     425388; K     423757; K     421571
K     415096; K     415089; K     414035; K     411958; K     410112; K     3835
44; K     369605; K     359976; K     357195; K     341855; K     341824; K
332024; K     328011; K     318584; K     315213
K     311964; K     308180; K     307377; K     299804; K     297889; K     2949
30; K     282571; K     279655; K     233129; K     218772; K     214196; K
198433; K     196528; K     195842; K     195558
K     192980; K     191778; K     188497; K     182393; K     166340; K     1507
17; K     140453; K     122998; K     103264; K     094715; K     094245; K
089041; K     088048; K     087775; K     068622
K     064840; K     061004
```

VIII. Cont.

J. F029008.ABS (Includes only the first part of the file)

0/5/1
1569212 E.I. Monthly No: EI8512120268
MICROWAVE MEASUREMENT OF DIELECTRIC PROPERTIES OF LOW-LOSS MATERIALS BY THE DIELECTRIC ROD RESONATOR METHOD.
Kobayashi, Yoshio; Katoh, Masayuki
Saitama Univ, Dep of Electrical Engineering, Urawa, Jpn
IEEE Transactions on Microwave Theory and Techniques v MTT-33 n 7 July 1985 p 586-592
CODEN: IETMAB ISSN: 0018-9480
Language: ENGLISH
Document Type: JA; (Journal Article) T?eatment: T; (Theoretical); X; (-Experimental)

Improvements in both accuracy and speed are described for the technique of measuring the microwave dielectric properties of low-loss materials by using a dielectric rod resonator short-circuited at both ends by two parallel conducting plates. A technique for measuring the effective surface resistance R//s of the conducting plates is proposed to allow the accurate measurement of the loss tangent tan DELTA . By means of a first-order approximation, expressions are analytically derived for estimating the errors of the measured values of relative permittivity EPSILON //r , tan DELTA , and R//s , for measuring the temperature coefficient of EPSILON //r , and for determining the required size of the conducting plates. Computer-aided measurements are realized by using these expressions. It is shown that the temperature dependence of R//s should be considered in tan DELTA measurements. Experimental results are given for a 99. 9-% alumina ceramic rod sample. 12 refs.

Descriptors: *MICROWAVE MEASUREMENTS; MATERIALS--Dielectric Properties; RESONATORS--Applications; MATHEMATICAL TECHNIQUES--Approximation Theory; TEMPERATURE MEASUREMENT--Computer Applications; MEASUREMENT ERRORS

Identifiers: DIELECTRIC ROD RESONATOR; LOW-LOSS MATERIALS; LOSS TANGENT; PARALLEL CONDUCTING PLATES SHORT-CIRCUIT; ERROR ESTIMATION OF MEASURED VALUES

Classsification Codes: 942 (Electrical & Electronic Measuring Instruments); 701 (Electricity & Magnetism); 708 (Electric & Magnetic Materials); 921 (Applied Mathematics); 723 (Computer Software); 944 (Moisture, Pressure & Temperature, & Radiation Measuring Instruments)

94 (INSTRUMENTS & MEASUREMENT); 70 (ELECTRICAL ENGINEERING); 92 (ENGINEERING MATHEMATICS); 72 (COMPUTERS & DATA PROCESSING)

RELEVANT_____ PARTIALLY RELEVANT_____ NOT RELEVANT_____

VIII. Cont.

F029008.ABS (cont.)

0/5/2
1565222   E.I. Monthly No: EI8512120261
MICROWAVE LOSS QUALITY OF BaZn//1/////3Ta//2/////30//3 CERAMICS.
Desu, A. B.; O'Bryan, H. M.
AT&T Technologies, Engineering Research Cent, Princeton, NJ, USA
Journal of the American Ceramic Society v 68 n 10 Oct 1985 p 546-551
CODEN: JACTAW   ISSN: 0002-7820
Language: ENGLISH
Document Type: JA; (Journal Article)   Treatment: A; (Applications); X; -(Experimental)

In the past few years a number of materials have been developed as microwave dielectrics. For these compositions with Zn it was found that the microwave loss quality Q was improved by sintering at very high temperatures or for longer times at lower temperatures. The increased Q has been explained in terms of ordering of Zn and Ta ions on the B site of the perovskite lattice. 10 refs.

Descriptors: *MICROWAVE DEVICES--*Manufacture; CERAMIC MATERIALS--Sintering; OSCILLATORS, MICOWAVE--Performance

Identifiers: CERAMIC RESONATORS; SINTERING PROCESS CONTROL; PEROVSKITE LATTICE

Classification Codes: 714 (Electronic Components); 715 (General Electronic Equipment); 812 (Ceramics & Refractories) 713 (Electronic Circuits)

71 (ELECTRONICS & COMMUNICATIONS); 81 (CHEMICAL PROCESS INDUSTRIES)

RELEVANT_____ PARTIALLY RELEVANT_____ NOT RELEVANT_____

VIII. Cont.

K. F029008.039

```
   1436463P   1402491R   1368412N   1366093P   1281300R   1130844R
1089508P
    740589N    721339R    720468R    506806E    383544E    341824E
308180E    294930E
```

L. F029008.DAT

```
1569212R   1565222P   1529876R   1529296N   1521577N   1515392R
1511482R   1509966N   1507612N   1494479P   1490941N   1489628P
1476100R   1471570N   1467354R   1459215N   1452918P   1451044P
1448820P   1448745N   1439545N   1437501R   1437429R   1436463P
1434056N   1434055N   1424745N   1412334N   1410704N   1402491R
1396964N   1393319R   1385383N   1383826P   1368412N   1366093P
1364561P   1362095R   1359704R   1354162N   1349654N   1335985N
1332280N   1305705N   1305533P   1303785P   1303058P   1301209N
1299270N   1295624R   1285727P   1281300R   1279025R   1277749N
1272060P   1262238N   1262237N   1255066R   1250334N   1238285R
1237376R   1229866P   1229442P   1219135R   1197294N   1175008N
1169669N   1160194P   1150698P   1145539P   1136726N   1130844R
1124464R   1123756N   1110065N   1101445N   1091166N   1089508P
1081393P   1039863P   1031696N   1016245N   1015991P   1010858N
967579P    964093P    962458N    957783R    957777N    956873R
954047R    942254N    932875N    914497N    912724N    884003N
866642N    865602N    854915N    851530N    844931N    844102N
844066R    842903N    831822N    826940N    823348N    820577N
812681N    791110N    791092R    788940N    788787P    783824R
776078P    769671P    766996R    766116N    766017N    763170N
763165N    760780N    757947P    749936N    740589N    734466N
732985R    732947N    730766N    730022R    721339R    720468R
714642P    707253R    696210N    674461N    667233N    665462N
649848P    645662P    639957R    633767N    629522R    595557N
594821P    592929R    587673N    584196N    572041N    570129N
566548E    566169E    565886E    562724E    560634E    556527E
552540E    545300E    542319E    535297E    526419E    525213E
525210E    525195E    510401E    508497E    506806E    506147E
504488E    503582E    492857E    482630E    466838E    459415E
442755E    436332E    436117E    425388E    423757E    421571E
415096E    415089E    414035E    411958E    410112E    383544E
369605E    359976E    357195E    341855E    341824E    332024E
328011E    318584E    315213E    311964E    308180E    307377E
299804E    297889E    294930E    282571E    279655E    233129E
218772E    214196E    198433E    196528E    195842E    195558E
192980E    191778E    188497E    182393E    166340E    150717E
140453E    122998E    103264E    094715E    094245E    089041E
088048E    087775E    068622E    064840E    061004E
```

VIII. Cont.

M. Q029008.OUT

1569212	RELEVANT
1565222	PARTIALLY RELEVANT
1529876	RELEVANT
1529296	NOT RELEVANT
1521577	NOT RELEVANT
1515392	RELEVANT
1511482	RELEVANT
1509966	NOT RELEVANT
1507612	NOT RELEVANT
1494479	PARTIALLY RELEVANT
1490941	NOT RELEVANT
1489628	PARTIALLY RELEVANT
1476100	RELEVANT
1471570	NOT RELEVANT
1467354	RELEVANT
1459215	NOT RELEVANT
1452918	PARTIALLY RELEVANT
1451044	PARTIALLY RELEVANT
1448820	PARTIALLY RELEVANT
1448745	NOT RELEVANT
1439545	NOT RELEVANT
1437501	RELEVANT
1437429	RELEVANT
1436463	PARTIALLY RELEVANT
1434056	NOT RELEVANT
1434055	NOT RELEVANT
1424745	NOT RELEVANT
1412334	NOT RELEVANT
1410704	NOT RELEVANT
1402491	RELEVANT
1396964	NOT RELEVANT
1393319	RELEVANT
1385383	NOT RELEVANT
1383826	PARTIALLY RELEVANT
1368412	NOT RELEVANT
1366093	PARTIALLY RELEVANT
1364561	PARTIALLY RELEVANT
1362095	RELEVANT
1359704	RELEVANT
1354162	NOT RELEVANT
1349654	NOT RELEVANT
1335985	NOT RELEVANT
1332280	NOT RELEVANT

VIII. Cont.

Q029008.OUT (cont.)

```
    1305705     NOT RELEVANT
    1305533     PARTIALLY RELEVANT
    1303785     PARTIALLY RELEVANT
    1303058     PARTIALLY RELEVANT
    1301209     NOT RELEVANT
    1299270     NOT RELEVANT
    1295624     RELEVANT
    1285727     PARTIALLY RELEVANT
    1281300     RELEVANT
    1279025     RELEVANT
    1277749     NOT RELEVANT
    1272060     PARTIALLY RELEVANT
    1262238     NOT RELEVANT
    1262237     NOT RELEVANT
    1255066     RELEVANT
    1250334     NOT RELEVANT
    1238285     RELEVANT
    1237376     RELEVANT
    1229866     PARTIALLY RELEVANT
    1229442     PARTIALLY RELEVANT
    1219135     RELEVANT
    1197294     NOT RELEVANT
    1175008     NOT RELEVANT
    1169669     NOT RELEVANT
    1160194     PARTIALLY RELEVANT
    1150698     PARTIALLY RELEVANT
    1145539     PARTIALLY RELEVANT
    1136726     NOT RELEVANT
    1130844     RELEVANT
    1124464     RELEVANT
    1123756     NOT RELEVANT
    1110065     NOT RELEVANT
    1101445     NOT RELEVANT
    1091166     NOT RELEVANT
    1089508     PARTIALLY RELEVANT
    1081393     PARTIALLY RELEVANT
    1039863     PARTIALLY RELEVANT
    1031696     NOT RELEVANT
    1016245     NOT RELEVANT
    1015991     PARTIALLY RELEVANT
    1010858     NOT RELEVANT
     967579     PARTIALLY RELEVANT
     964093     PARTIALLY RELEVANT
```

VIII. Cont.

Q029008.OUT (cont.)

```
    962458    NOT RELEVANT
    957783    RELEVANT
    957777    NOT RELEVANT
    956873    RELEVANT
    954047    RELEVANT
    942254    NOT RELEVANT
    932875    NOT RELEVANT
    914497    NOT RELEVANT
    912724    NOT RELEVANT
    884003    NOT RELEVANT
    866642    NOT RELEVANT
    865602    NOT RELEVANT
    854915    NOT RELEVANT
    851530    NOT RELEVANT
    844931    NOT RELEVANT
    844102    NOT RELEVANT
    844066    RELEVANT
    842903    NOT RELEVANT
    831822    NOT RELEVANT
    826940    NOT RELEVANT
    823348    NOT RELEVANT
    820577    NOT RELEVANT
    812681    NOT RELEVANT
    791110    NOT RELEVANT
    791092    RELEVANT
    788940    NOT RELEVANT
    788787    PARTIALLY RELEVANT
    783824    RELEVANT
    776078    PARTIALLY RELEVANT
    769671    PARTIALLY RELEVANT
    766996    RELEVANT
    766116    NOT RELEVANT
    766017    NOT RELEVANT
    763170    NOT RELEVANT
    763165    NOT RELEVANT
    760780    NOT RELEVANT
    757947    PARTIALLY RELEVANT
    749936    NOT RELEVANT
    740589    NOT RELEVANT
    734466    NOT RELEVANT
    732985    RELEVANT
    732947    NOT RELEVANT
```

VIII. Cont.

Q029008.OUT (cont.)

```
    730766    NOT RELEVANT
    730022    RELEVANT
    721339    RELEVANT
    720468    RELEVANT
    714642    PARTIALLY RELEVANT
    707253    RELEVANT
    696210    NOT RELEVANT
    674461    NOT RELEVANT
    667233    NOT RELEVANT
    665462    NOT RELEVANT
    649848    PARTIALLY RELEVANT
    645662    PARTIALLY RELEVANT
    639957    RELEVANT
    633767    NOT RELEVANT
    629522    RELEVANT
    595557    NOT RELEVANT
    594821    PARTIALLY RELEVANT
    592929    RELEVANT
    587673    NOT RELEVANT
    584196    NOT RELEVANT
    572041    NOT RELEVANT
    570129    NOT RELEVANT
    566548    NOT EVALUATED
    566169    NOT EVALUATED
    565886    NOT EVALUATED
    562724    NOT EVALUATED
    560634    NOT EVALUATED
    556527    NOT EVALUATED
    552540    NOT EVALUATED
    545300    NOT EVALUATED
    542319    NOT EVALUATED
    535297    NOT EVALUATED
    526419    NOT EVALUATED
    525213    NOT EVALUATED
    525210    NOT EVALUATED
    525195    NOT EVALUATED
    510401    NOT EVALUATED
    508497    NOT EVALUATED
    506806    NOT EVALUATED
    506147    NOT EVALUATED
    504488    NOT EVALUATED
    503582    NOT EVALUATED
    492857    NOT EVALUATED
    482630    NOT EVALUATED
```

VIII. Cont.

Q029008.OUT (cont.)

```
     466838     NOT EVALUATED
     459415     NOT EVALUATED
     442755     NOT EVALUATED
     436332     NOT EVALUATED
     436117     NOT EVALUATED
     425388     NOT EVALUATED
     423757     NOT EVALUATED
     421571     NOT EVALUATED
     415096     NOT EVALUATED
     415089     NOT EVALUATED
     414035     NOT EVALUATED
     411958     NOT EVALUATED
     410112     NOT EVALUATED
     383544     NOT EVALUATED
     369605     NOT EVALUATED
     359976     NOT EVALUATED
     357195     NOT EVALUATED
     341855     NOT EVALUATED
     341824     NOT EVALUATED
     332024     NOT EVALUATED
     328011     NOT EVALUATED
     318584     NOT EVALUATED
     315213     NOT EVALUATED
     311964     NOT EVALUATED
     308180     NOT EVALUATED
     307377     NOT EVALUATED
     299804     NOT EVALUATED
     297889     NOT EVALUATED
     294930     NOT EVALUATED
     282571     NOT EVALUATED
     279655     NOT EVALUATED
     233129     NOT EVALUATED
     218772     NOT EVALUATED
     214196     NOT EVALUATED
     198433     NOT EVALUATED
     196528     NOT EVALUATED
     195842     NOT EVALUATED
     195558     NOT EVALUATED
     192980     NOT EVALUATED
     191778     NOT EVALUATED
     188497     NOT EVALUATED
     182393     NOT EVALUATED
     166340     NOT EVALUATED
```

VIII. Cont.

Q029008.OUT (cont.)

```
     150717     NOT EVALUATED
     140453     NOT EVALUATED
     122998     NOT EVALUATED
     103264     NOT EVALUATED
     094715     NOT EVALUATED
     094245     NOT EVALUATED
     089041     NOT EVALUATED
     088048     NOT EVALUATED
     087775     NOT EVALUATED
     068622     NOT EVALUATED
     064840     NOT EVALUATED
     061004     NOT EVALUATED
```

N. D029008.039

```
microwaves
ceramic materials
ceramic materials - sintering
ceramic?
fir?
firing
sinter?
microwave?
radiation
```

O. SEAR039.OUT (Includes only two questions)

```
                          Searcher No. 039

  QUEST-DBASE   TOTAL #   TOTAL #   TOTAL #   TOTAL #   TOTAL #    TOTAL #
    NUMBER       RELV      PREL      NREL      EVAL      NEVL     RETRIEVED

    022108        15        135        0        150       365        515

                # of relevant items    :   0
                # of partially relv    :   6
                #  of  not relevant    :   0
                ---------------------------
                total # evaluated      :   6
                #  not evaluated       :  64
                ----------------------------
                total # retrieved      :  70

                      recall           : 0.040
                     precision         : 1.000

                total # of search terms:   9
                total # of commands    :  26
                total # of cycles      :   6

                on-line connect time   : 0.306
                off preparation time   : 0.250
                ----------------------------
                total searching time   : 0.556

    029008        36         34       80        150        77        227

                # of relevant items    :   5
                # of partially relv    :   3
                #  of  not relevant    :   2
                ---------------------------
                total # evaluated      :  10
                #  not evaluated       :   5
                ----------------------------
                total # retrieved      :  15

                      recall           : 0.114
                     precision         : 0.800

                total # of search terms:   9
                total # of commands    :  25
                total # of cycles      :   6

                on-line connect time   : 0.268
                off preparation time   : 0.250
                ----------------------------
                total searching time   : 0.518
```

VIII. Cont.

P. QUES029.OUT

```
                          Question No. 029
                          Database No. 008

                 *******************************
                 *  Summary of Search Results  *
                 *******************************


                 # Relevant abstracts  :    36
                 # Partially relevant  :    34
                 # Not relevant        :    80
                 # Evaluated           :   150
                 # Not evaluated       :    77
             Total # of references     :   227


             User evaluation:

                 User's time             : 0.75 hrs.
                 Dollar value assigned   : $200.00
                 Worth assigned          :  5
                 Problem resolution      :  4
                 Satisfaction            :  4


             Searcher evaluation:

                 A: # Relevant            H: Precision
                 B: # Partially relevant  I: Total # commands
                 C: # Not relevant        J: Total # cycles
                 D: Total # evaluated     K: Total # search terms
                 E: # Not evaluated       L: Online connect time
                 F: Total # retrieved     M: Preparation time
                 G: Recall                N: Total time


SEAR   A    B    C    D    E    F   G     H       I    J    K   L     M     N

011    8    8   12   28   22   50 0.229 0.571    32    2   24 0.076 0.083 0.159
027   15   13   50   78   23  101 0.400 0.359    19    7   15 0.161 0.250 0.411
038    3    1    1    5    3    8 0.057 0.800    17    6    9 0.326 0.167 0.493
039    5    3    2   10    5   15 0.114 0.800    25    6    9 0.268 0.250 0.518
040    3    0    0    3    0    3 0.042 1.000    30    9   22 0.423 0.333 0.756
120   28   10   13   51   24   75 0.543 0.745     9    4    5 0.198 0.250 0.448
220    7    4    1   12    5   17 0.157 0.917     7    2   13 0.156 0.250 0.406
320   19    9   15   43   33   76 0.400 0.651    10    1   17 0.258 0.283 0.541
420    6    5    2   13    0   13 0.157 0.846    11    2   17 0.188 0.417 0.605
```